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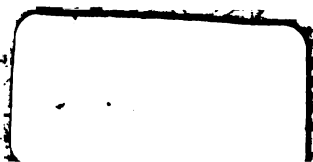
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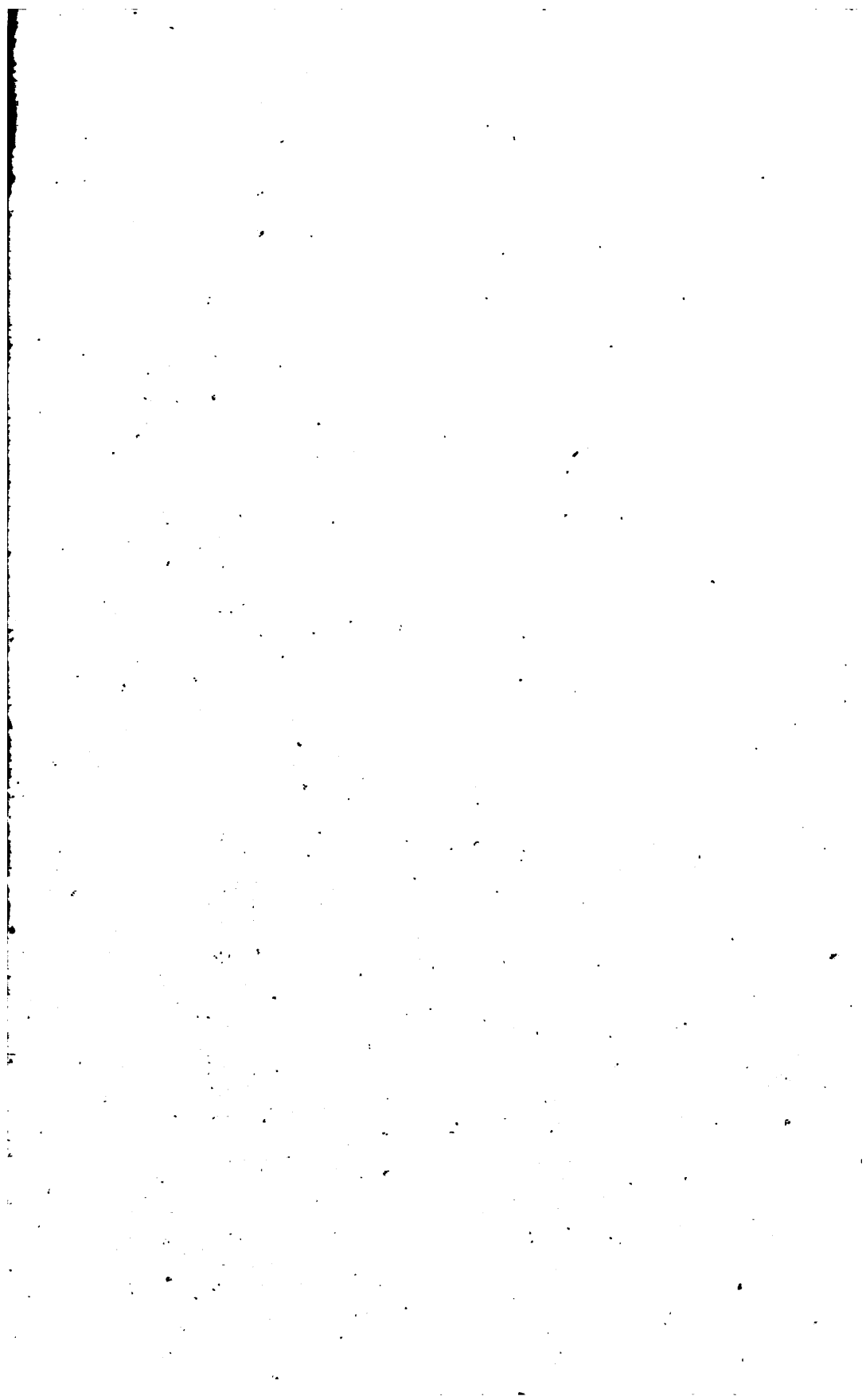
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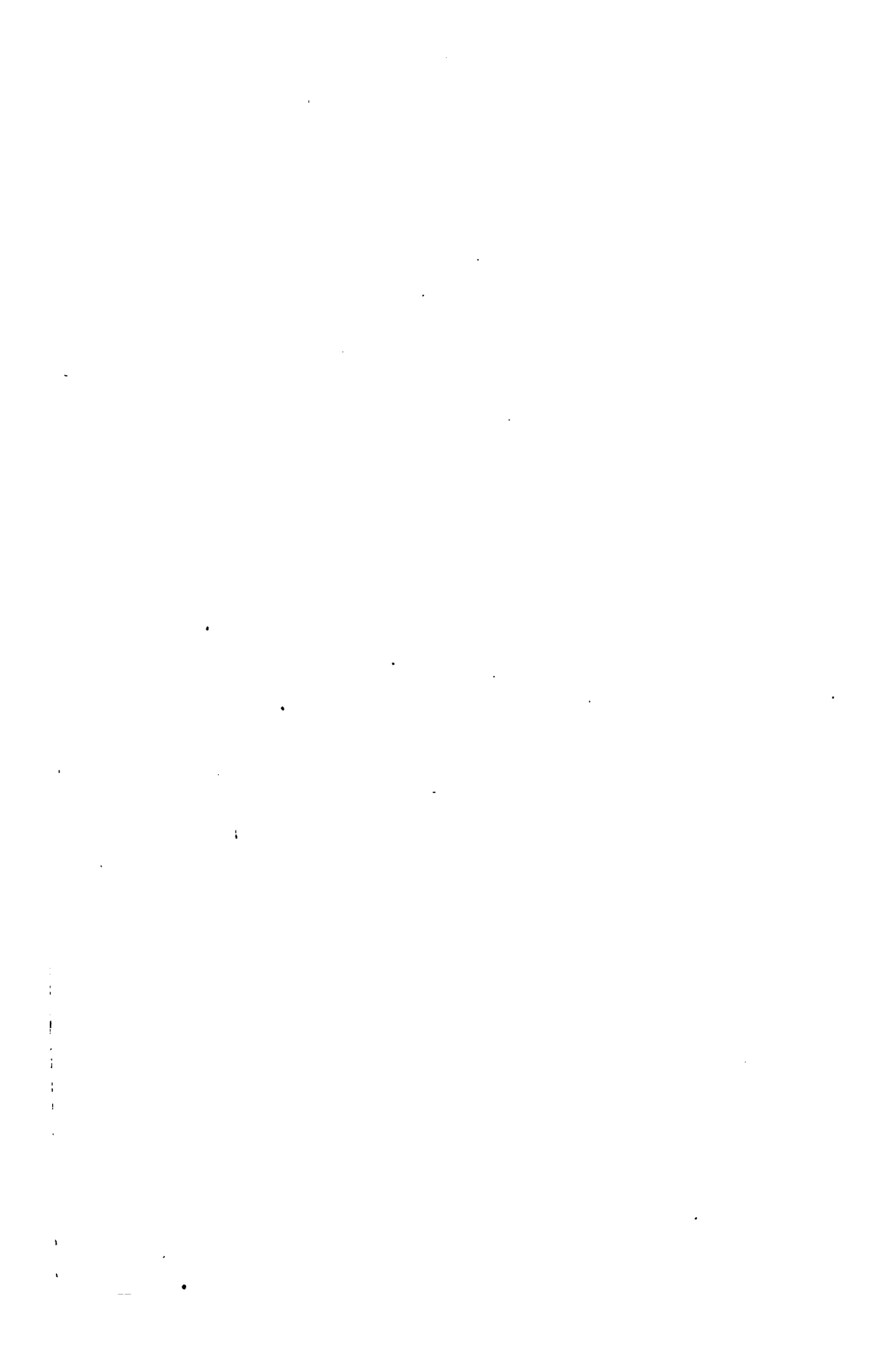
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M. E. C. Corrigan



ANNUAL  
OF THE  
UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL  
SANITARY SCIENCES THROUGHOUT THE WORLD.

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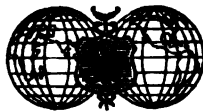
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## GENERAL THERAPEUTICS.

By J. P. CROZER GRIFFITH, M.D.,  
PHILADELPHIA.

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By way of preface to the notes on General Therapeutics for the year 1888, I can but repeat what was said in beginning the same subject in the last volume of the ANNUAL, that the omission of reference to any important therapeutical papers found in the journals during the year is to be explained by the fact that these articles have been given into the hands of editor of other departments, and references to them should be sought for there. The number of journal articles handed me has been enormous—so great, in fact, that I have been obliged to condense remarks upon them as far as possible. In order to do this, and to avoid duplicating subject-matter, an arrangement has been made with the editor of the department of Experimental Therapeutics, by which all botanical and chemical matters, including the description of drugs, etc., have been referred to him, and the department of General Therapeutics confined strictly to the clinical application of medicines, including some remarks on food and water.

*Acetanilid* (*Antifebrin*).—Squibb<sup>741</sup>, <sup>5</sup><sub>V.A.No.3, Sept.</sub> says that antifebrin and acetanilid are identical, but that the former name is controlled by patent. Under the latter title, therefore, it only costs one-half as much, and one-eighth the price of antipyrin. Feeling that physicians should discourage, as far as possible, the employment of patented articles, I have given preference to the title “acetanilid,” more especially, too, as it expresses the derivation and chemical composition of the drug. Reviewing the reports on its *antipyretic* action which have come to my notice, I find that G. Guttman<sup>4</sup>, <sup>Dec. 12, '87 has administered acetanilid to 181 cases of various febrile affections (not including patients with rheumatism). These were divided among various diseases, including 10 cases of typhoid fever and 25 of pneumonia, with 16 of acute bronchitis and 81 of gastric fever occurring especially in children. He is opposed to the giving of small divided doses as ineffectual, and obtains better</sup>

results with a single dose of 0.25 to 0.75 gram. ( $3\frac{3}{4}$  to  $11\frac{1}{4}$  grains). The action of the drug was especially favorable in children where a slight gastric fever or moderate bronchial catarrh had produced decided elevation of temperature. One dose was usually sufficient to bring about a lasting, completely afebrile condition. In typhoid fever he believes that results obtained with the internal antipyretics are at least as good as with the cold bath, and of these substances he deems acetanilid the best in this affection. He gives to all cases 0.5 gram. ( $7\frac{1}{2}$  grains) morning and night, and persists in this treatment until the end of the third week. Occasionally the dose must be given three times a day for 2 to 3 days. After 12 to 14 days 0.25 gram. ( $3\frac{3}{4}$  grains) is usually sufficient. In this way a complete dissipation of fever, lasting often 6 hours, was obtained in every case, and the subjective sensations of the patient were greatly improved. Such good results could only be obtained with antipyrin in doses of 4 to 5 gram. (60 to 75 grains), given at least twice daily, and such large amounts he has often seen followed by extremely dangerous conditions of collapse. Moreover, the duration of the apyrexia lasted never more than 4 hours. Demme<sup>57</sup><sub>No. 4</sub>, <sup>224</sup><sub>Feb. 16</sub> considers acetanilid useful only in subduing excessively high temperature, but not in maintaining apyrexia. The duration of the effect is much less than with antipyrin. L. Löwenthal<sup>116</sup><sub>Sept.</sub> praises its action as an antipyretic, and says that even in children it may often be given in large doses. He has administered 0.25 gram. ( $3\frac{3}{4}$  grains) per dose to a child of  $1\frac{3}{4}$  years old, but he by no means advises this large amount as a rule. The first dose should always be small, not over 0.01 gram. ( $\frac{1}{6}$  grain) for a child of 1 year. Ademski<sup>586</sup><sub>No. 57, 77</sub>, <sup>61</sup><sub>Mar. 17</sub> tested the antipyretic action of the drug in various febrile disorders. The temperature was invariably lowered and sweating was a constant result. Not all patients bear the remedy well. Diuresis was a symptom in a majority of cases. E. Houston<sup>82</sup><sub>Apr. 7, May 19</sub> reports a case of puerperal septicæmia whose symptoms at once improved under the administration of acetanilid. He considers it an internal antiseptic. F. Huthins<sup>82</sup><sub>May 19</sub> reports several cases illustrative of the power of acetanilid to reduce fever. Bernheim and Simon<sup>184</sup><sub>Feb. 15</sub> made a study of its action on temperature, and conclude that it is a safe and effective antithermic, much superior to antipyrin. They have given it in 223 cases and have never seen any results follow it which imperiled life. Way<sup>9</sup><sub>v. 33, p. 11</sub> has

treated 13 cases of typhoid fever with small doses, producing a favorable reduction of temperature without unpleasant symptoms. He believes the drug to be absolutely safe, and only injurious when given in what he calls *toxic* doses. J. H. McCassey<sup>82</sup><sub>Sept. 29</sub> uses acetanilid freely in inflammation and acute fever, both in infants and children. In continued fevers it should be given with caution. W. J. Mayberry<sup>186</sup><sub>Sept.</sub> finds it a valuable substitute for quinine in reducing temperature. W. P. Munn<sup>185</sup><sub>Sept.</sub> has given about 3500 doses of acetanilid to nearly 100 patients with various diseases. He found it a reliable antipyretic, not followed by unpleasant symptoms. A. L. Clark<sup>192</sup><sub>Sept.</sub> says that 10 gr. (0.65 gram.) doses have served him well as an antipyretic in fever. Roddick<sup>130</sup><sub>Jan.</sub> and Blackader<sup>130</sup><sub>Jan.</sub> found the drug of very little service in reducing the temperature of erysipelas. McConnell<sup>130</sup><sub>Jan.</sub> reports 16 cases, chiefly of febrile affections, in which he has found it serviceable. As an antipyretic its action was very satisfactory, the temperature beginning to fall in 10 to 15 minutes after its administration. Large doses are required in erysipelas. It relieves, also, the headache of typhoid fever. The dose varies from 6 to 15 grains (0.39 to 1 gram.) for an adult, but since individual susceptibility varies considerably it is best to begin with small amounts. Cyanosis is an evidence of overdose. Regarding the value of acetanilid as a specific for *rheumatism*, G. Guttman's<sup>4</sup><sub>Dec. 12, '97</sub> experience has been very large, he having used it in 52 acute and 29 chronic cases of articular rheumatism and in 167 cases of "general" rheumatism—under which title are included the most varied rheumatic affections. The total number of cases equals 248. As a specific against the disease the remedy appears to be in no way behind salicylic acid, antipyrin, and salol, and in some respects superior to them. The dose employed was 0.5 to 1 gram. ( $7\frac{1}{2}$  to 15 grains) twice, rarely three times a day. The action was usually sure and remarkably prompt, even in chronic cases. An involvement of the heart was observed in none of the cases of acute rheumatism. As with all remedies and diseases, there are, of course, cases in which it does not act so favorably as do other anti-rheumatics. D. N. Moore<sup>82</sup><sub>Apr. 23</sub> reports a severe case of inflammatory rheumatism promptly cured by it. W. P. Munn<sup>185</sup><sub>Sept.</sub> found that it relieved all but the most intense pains of the disease, and Destrée and Slosse<sup>276</sup><sub>June 30</sub> and Carpentier<sup>276</sup><sub>Jan. 20</sub> speak highly of its action in reducing pain and swelling.

The chief modern use of acetanilid is for its *sedative* action in various nervous disorders and for the relief of pain. A hypnotic action has also been reported in several instances. Sarda<sup>89</sup><sub>May 2</sub> concludes, from a large experience, that it is superior to antipyrin in old neuralgias and in controlling motor excitation. In paralysis agitans, however, neither of the drugs was beneficial, so far as the author's experience extended. S. R. Humston<sup>19</sup><sub>Jan. 14</sub> finds in acetanilid a medicine which will relieve nearly every kind of headache and produce a more natural sleep than that caused by opium or chloral. He reports in brief 3 cases illustrating its value. A. L. Clark<sup>192</sup><sub>Sept.</sub> has had very good results with it in headaches of various sorts. He gives 8 to 10 grains (0.51 to 0.65 gram.) in a single dose, and expects the desired result in 20 to 30 minutes. He has never seen any unfavorable results follow it. Borosnyói<sup>2</sup><sub>Apr. 28</sub> compared, in 9 cases of epilepsy, the action of bromide of potash with that of acetanilid. It was evident that the latter had very little influence on the disease, though sufficiently large doses were given in each case to produce cyanosis. R. Hirsch<sup>116</sup><sub>Oct.</sub> has used it as a nervine in a large number of cases of neuralgic and other pain, and finds it exceedingly valuable. As a hypnotic it possesses but little power except in febrile states, but in these its action is quite marked. The dose employed was 0.5 gram. ( $7\frac{1}{2}$  grains), to be repeated in 30 to 40 minutes, if necessary. E. J. Talcott<sup>192</sup><sub>Oct.</sub> gives the notes of a case of severe neuralgia successfully treated with it, and Adamski<sup>596</sup><sub>No. 27, '97</sub> has found it in large doses to exercise hypnotic effects, and in acute rheumatism and erysipelas to manifest an anodyne action. J. B. Kell<sup>59</sup><sub>Feb. 16</sub> reports an interesting case of a patient with acute alcoholism, delirium, and entire insomnia, who was promptly put to sleep by acetanilid, after chloral, bromide of potash, and opium had severally failed to give any relief. W. P. Munn<sup>185</sup><sub>Sept.</sub> has often found it take the place of opium in painful diseases. In neuralgias and insomnia it was frequently superior to the bromides, but often failed. Five grains (0.32 gram.) was the initial dose, and he but once exceeded 10 grains (0.64 gram.) at one time. W. Warfvinge<sup>370</sup><sub>Aug.</sub> considers acetanilid a nervous sedative equal to antipyrin, and of value in neuralgia and other painful affections. (Report of Dr. Eklund, corresponding editor.) Stewart<sup>130</sup><sub>Jan.</sub> has given 5-grain (0.32 gram.) doses successfully to relieve the lightning pain of locomotor ataxia. S. Merkel<sup>34</sup><sub>June 15</sub> concludes

from the study of 49 cases that the drug is a serviceable remedy in neuralgia of the cranial nerves, migraine, and rheumatic headache. In other forms of headache it is of less value, and in that of traumatic origin or depending on organic lesion of the brain or its membranes it is entirely useless. D. Morton<sup>224</sup> reports 15 cases of various painful affections unaccompanied by fever, in most of which 10-grain doses (0.65 gram.), repeated in 1 to 2 hours, gave relief to pain, generally with more or less somnolence. All were cases of headache, with the exception of one of sciatica and one of uterine pain. J. Fischer<sup>169</sup> has given it in doses of  $\frac{1}{2}$  to  $1\frac{1}{2}$  gram. ( $7\frac{1}{2}$  to  $22\frac{1}{2}$  grains) without injurious action and with very satisfactory results in headaches, neuralgia, and the pelvic pains of menstruation. He has also tried the drug in epilepsy, but found it to be without effect upon the disease. As a hypnotic it is uncertain, and is serviceable in but few cases. Proudfoot<sup>130</sup> has found doses of 10 to 15 grains (0.65 to 1 gram.) repeated in an hour, if necessary, to almost instantly relieve the pain of iritis and glaucoma. McConnell<sup>130</sup> has proved it of value in headaches of a non-febrile nature, as well as when fever was present. E. Houston<sup>82</sup> says it has acted well in nervous insomnia and as a cardiac tonic in weak heart. F. Huthins<sup>82</sup> reports cases illustrative of its power to relieve pain. R. F. Lewis<sup>43</sup> reports a case in which the drug appeared to act as an aphrodisiac. The *local application* of the drug has been recommended by G. Guttman<sup>4</sup> as a very effective antiseptic dressing when spread in powder over denuded surfaces, and J. McQuaid<sup>186</sup> says that in acute coryza a pinch of acetanilid snuffed up the nose will give immediate relief. Finally, in respect to unpleasant or *dangerous effects* produced by it, G. Guttman<sup>4</sup> claims that one of its greatest advantages is the absence of any real unpleasant effects. It never in his experience produces nausea or vomiting, true collapse, nor cardiac depression. Ringing in the ears or cutaneous eruption does not occur. Profuse sweating does, it is true, sometimes annoy the patient. A cyanosis of the lips and cheeks sometimes appears, but this is a symptom of no import. Hæmaturia was seen in none of the author's 429 cases. Richter<sup>41</sup> too, while referring to the oft-quoted dangers said to attend the long-continued use of acetanilid, reports a case of cardiac dilatation, to whom 0.5 to 3 gram. ( $7\frac{1}{2}$  to 45 grains) of it had been given daily for over a year, and without any bad result,

and Destrée and Slosse<sup>276</sup><sub>Jan. 20</sub> claim that no serious inconvenience results from the administration of 1 to 2 gram. (15 to 30 grains) at a time, and that it is fully equal to antipyrin. Accidents do, however, certainly follow its administration, and unpleasant after-effects are not uncommon. Hardy<sup>3</sup><sub>Feb. 22</sub><sup>2</sup><sub>Mar. 24</sub> reported a case in which sudden death had followed the eighth administration of 1 gram. (15 grains) of the drug. The extraordinary rapidity with which coldness and rigidity had set in caused him to attribute it to the medicine. Kronecker<sup>116</sup><sub>Sept.</sub> reports a case of collapse occurring after a dose of 0.2 gram. (3 grains). As the same dose had been given 8 times in the 4 preceding days without any evil result, the author considers this a possible instance of cumulative action on the part of acetanilid. In another case the fall of temperature required 8 hours to equal only 0.8° C. (1.1° F.). A very severe chill then set in, and lasted  $\frac{1}{2}$  hour. Demme<sup>57</sup><sub>Nov. 4</sub> refers to nausea and profuse diarrhœa produced by it in 2 cases. L. Löwenthal<sup>116</sup><sub>Sept.</sub> reports a case where a very small amount produced dangerous collapse. R. E. Kiernan<sup>186</sup><sub>Oct.</sub> finds that it produces a great degree of prostration in the majority of cases. J. T. Bringier<sup>186</sup><sub>Oct.</sub> tried it twice in dysentery, but in each instance there was copious sweating, depression, and a renewed rise of temperature in 4 hours.

*Acetic Acid.*—Engelmann<sup>59</sup><sub>Nov. 24</sub> has for 2 years used acetic acid as a disinfectant in obstetrical practice in a large number of cases. A 3 per cent., or sometimes a 5 per cent., solution was ordinarily employed. He would recommend that it take the place of carbolic acid and of corrosive sublimate for intrauterine injection. It is much more diffusible than the latter, is less injurious to instruments, and is entirely without danger to the patient. The skin of the hand is rendered peculiarly soft and pleasant by it. The hands must be washed twice after using it, as soap will not, of course, dissolve where it is present.

*Aconitine.*—Leroy<sup>107</sup><sub>Mar. 16</sub> reports good results from aconitine in headaches of syphilitic origin, especially those of the secondary period, and says that it should be tried when quinine or iodide of potash cannot be given. When the pain depends on a serious cerebral lesion, the medicine does more harm than good. The amount administered during 24 hours did not, in his practice, exceed  $\frac{1}{1000}$  grain (0.001 gram.). A. Cohn<sup>41</sup><sub>Oct. 22</sub> tried injections of the alkaloid in various neuralgias, but found them excessively painful and productive of toxic symptoms.

*Adonis Æstivalis*.—F. Borgiotti<sup>477</sup><sub>Jan., Aug. 20</sub><sup>41</sup> has employed this plant in a large number of cases of different cardiac disorders, and claims, from careful observations, that 4 to 30 gram. (3 l to 3 l) of the infusion daily constitutes an excellent cardiac tonic. In fatty degeneration of the heart it increases diuresis and regulates the circulation. In many cases of heart-disease the drug is effective when digitalis is useless or injurious.

*Adonis Vernalis*.—Boy-Teissier<sup>46</sup><sub>Mar. 20</sub> concludes, from the use of adonis vernalis in 33 cases, that it will sometimes succeed where digitalis has failed completely, but that it is often not given in sufficiently large dose. He reports a case illustrative of the tolerance toward large doses of the infusion.

*Agaricine*.—A. Radcliffe<sup>80</sup><sub>Jan. 11</sub> reports the good effects of agaricine in checking the sweats of several cases of phthisis. It was administered in a single pilule taken at night and containing about  $\frac{1}{20}$  to  $\frac{1}{16}$  grain (0.0032 to 0.004 gram.) of the drug. The author combined with it  $\frac{1}{25}$  grain (0.0026 gram.) of Dover's powder as recommended by Lauschmann<sup>512</sup><sub>Nov. 27, '97</sub> and Jonng<sup>80</sup><sub>Jan. 15</sub> on the ground that by its use the laxative properties of the agaricine were reduced. A. B. Pope<sup>80</sup><sub>Jan. 11</sub> found that  $\frac{1}{8}$  of a grain (0.008 gram.) at bed-time, repeated every 2 to 4 hours through the night, if necessary, gave very gratifying results in the night-sweats of phthisis. In several instances it succeeded where atropia failed, and without giving rise to any unpleasant symptoms. The number of cases treated probably exceeded 100, and in most of these no other medication was employed. He also combined it with aromatic sulphuric acid, and recommends that it be sometimes exhibited with atropia. G. R. Butler<sup>157</sup><sub>May</sub> tested agaricine in several cases of phthisis, but was forced to the conclusion that it was of very little value as a remedy for pathological sweating.

*Alcohol*.—The discussion on alcohol still occupies considerable space in the medical journals, as there still are those who would altogether condemn it. V. Jaksch<sup>80</sup><sub>Apr. 20</sub> believes that alcohol is a useful food in fever; that cases of diphtheria in which it has been freely given are less liable to develop cyanosis or collapse; that it is of value in the treatment of typhoid fever, and especially so in that of septic diseases. Its antipyretic action he considers of minor importance. Under certain circumstances it appears to influence digestion favorably, but severe organic or functional disorders of

the stomach must not be present. In neurasthenia the hypnotic action of alcohol may sometimes be made use of. Where it is used for nourishment, the light wines are the best form in which to administer it; but where powerful stimulation is desired, beverages containing a higher per cent. of alcohol are indicated. Erb, Merkel, Nothnagel, Jürgensen, Rühle, and Finkler took part in the discussion at the Congress for Internal Medicine,<sup>99</sup> at which v. Jaksch's remarks were made. None of them were opposed to the use of alcohol in suitable conditions, but agreed that it should not be given indiscriminately in disease. Jacobi<sup>51</sup> highly recommends it in some shape in those diseases of children which produce depressed strength and vitality, though it is contra-indicated in those of a sthenic type. He advises that in the hottest days of summer a teaspoonful of whisky be administered daily. In sepsis of all forms, especially in the septic forms of diphtheria, it is almost impossible to give too much; and he who is not afraid of increasing the amount when a smaller dose has failed, will soon convince himself of its power of good. Of all the forms of alcohol he recommends whisky, because it can be obtained pure more easily, is less expensive, and has for many a less disagreeable taste. Brandies are too frequently adulterated with fusel oil, and the ether of wines militates against any antifebrile effect which might be expected from them. B. W. Richardson<sup>38</sup> writes in praise of the method of administering stimulant recommended by him 19 years ago. In order that he may know exactly what he is prescribing, he avoids wines, spirits, and beers, and gives alcohol merely, believing that this is the only way in which it can be scientifically applied in the treatment of disease. He mixes it in the proportion of 3 ½ (15.5 gram.) of alcohol, 3 1 (4 gram.) of glycerine, and 3 2 (62 gram.) of water. The author, however, expresses the opinion in a previous article<sup>38</sup> that alcohol should not be used when other equally efficient remedies can be substituted. There is nothing he knows of more satisfactory in medicine than the treatment of fevers without alcohol in any shape. W. M. Brinton<sup>161</sup> reports 3 cases illustrative of the value of the persistent employment of alcoholic stimulants hypodermically. In all of these life was almost certainly saved in this way. An editorial review<sup>2</sup> of the Annual Report of the London Temperance Hospital indicates that, while the results there are good in the surgical department, recovery is



apt to be too long delayed in medical cases treated without alcohol, and patients often die from exhaustion after a very lingering sickness. On behalf of the trustees of the hospital, an answer to this appears from the pen of Rev. D. Burns, D.D.,<sup>2</sup><sub>Mar. 24</sub> claiming that this method of criticism is unfair, and that the hospital's results for a *series* of years should have been studied. This would show that out of 66 cases of typhoid fever treated without alcohol up to 1886, 61 had recovered. Greely's experience<sup>31</sup><sub>Feb. 14</sub> with liquors in Arctic latitudes corroborates the well-established views regarding the physiological action of the drug. It was found that when spirits were given while the men were on the march, the power of resistance to cold was impaired; but that when taken in small quantities  $\frac{3}{4}$  2 (62 gram.) after the day's work was over, there was a distinct stimulation of the mental faculties. E. F. Parsons,<sup>61</sup><sub>June 16</sub> claims that the authority of great antiquity supports the use of alcohol in medicine. He considers it both a stimulant and a food, and believes it should be used in all diseases causing death by exhaustion. E. N. Liell,<sup>1</sup><sub>Dec. 21, '97</sub> reviews the therapeutics of alcohol in disease, quoting largely from acknowledged masters on the subject. He concludes that in it we have one of the most powerful and substantial agents. No routine practice, however, can be followed in its employment, but each case must be treated upon its merits and according to the indications presented. J. D. Nicodemus<sup>186</sup><sub>Feb.</sub> quotes several writers in support of his views that stimulants are not needed in the treatment of disease. G. W. Nihart<sup>186</sup><sub>May</sub> gives counter-quotations and arguments for the use of alcohol, believing that he has saved many lives thereby; whereupon Nicodemus again writes<sup>186</sup><sub>Aug.</sub> in answer, maintaining his position by new quotations. S. Adams,<sup>186</sup><sub>Aug.</sub> in a very interesting short article, gives the results of his medical experience of nearly 50 years as against the employment of alcohol in disease. Such an extended experience cannot but carry weight with it, but the arguments used indicate rather the value of abstinence in *health* from the use of stimulants. D. P. Jackson<sup>186</sup><sub>Jan.</sub> says that the composition of alcoholic liquors is so uncertain that he uses the following formula: Tinct. aurantii,  $\frac{3}{4}$  1 (3.89 gram.); glycerini,  $\frac{3}{4}$  1 (31 gram.); caramel, q.s.; alcohol,  $\frac{f}{3}$  8 (249 gram.); aquæ, add 1 pint (500 gram.). This mixture he considers equal to any \$25 brandy in point of flavor, while the cost of the ingredients is only about 30 cents a pint. C. R. Drys-

dale,<sup>22</sup><sub>May 1</sub> thinks alcoholic stimulants are very rarely necessary in typhoid fever, and that the disease does better with cold affusions or baths and milk diet. T. J. Mays<sup>19</sup><sub>Mar. 24</sub> says that the fact that so large doses of alcohol can be taken in disease by those usually susceptible to small amounts in health proves that the substance is a food, and that it furnishes force to the diseased economy. H. E. Locher,<sup>202</sup><sub>Mar. 26</sub> though warning against its abuse, claims that it is an agent capable of doing great good. E. Chénery,<sup>60</sup><sub>Jan.-Dec.</sub> has contributed a long series of articles in the form of reviews of our knowledge of alcohol in all its bearings, and discusses very interestingly the sophistications of different forms of alcoholic beverages. Kretzschmann,<sup>90</sup><sub>Feb. 16</sub> considered it both a food and a medicine. He found it especially useful in diphtheria; but the dose and frequency of administration should not be left to the judgment of patients or friends. J. Solis-Cohen<sup>104</sup><sub>Feb. 4</sub> believes that, in spite of all said against it, it is undoubtedly a food in phthisis and other wasting diseases. Large doses are usually not essential. Sometimes malt liquors are preferable to spirits.

*Aletris Farinosa*.—E. C. Rothrock,<sup>176</sup><sub>May 1</sub> writes in favor of the root of this plant, which he has used and prescribed with advantage for 30 years. He believes it to have a tonic action, especially on the female generative organs, and to be of value in suppressed menstruation, amenorrhea, dysmenorrhœa, leucorrhœa, congestion of the ovaries, menorrhagia, etc. Apart from these properties, it relieves flatulence and indigestion by increasing the tone of the stomach. The fluid extract or the saturated tincture may be given in doses of 20 to 30 drops of the former and 5 to 10 of the latter.

*Aliments*.—Of the various forms of nourishment, *milk* and its derivatives seem to have received the greatest attention during the past year. Créquy<sup>3</sup><sub>Oct. 17</sub> reports the case of a young girl with typhoid fever who vomited all food and medicine, and whose case seemed hopeless. Finally she was nourished by the administration of asses' milk given frequently in small amounts. Sour milk is spoken of very favorably by Osthoff,<sup>22</sup><sub>Feb. 3</sub> for the treatment of summer diarrhœa in adults as well as in children. He believes that the bacilli of sour milk destroy and overcome by their rapidity of growth the other micro-organisms which are the cause of the diarrhœa. It is also a useful dietetic agent in dyspepsia, chronic intestinal or

hepatic diseases with diarrhœa or constipation, jaundice, typhoid fever, pneumonia, and erysipelas. In tuberculosis of the intestines, however, he found it increased the diarrhœa. As a food it nearly resembles fresh milk in composition, and forms a refreshing drink in summer. As it sometimes causes diarrhœa, it should be given with caution in this disease in infants. E. C. Anderson<sup>2</sup><sub>Dec. 24, '97</sub> describes more accurately the method of manufacture of *koumiss*, and the koumissed peptones referred to in the ANNUAL of last year. E. N. Liell,<sup>1</sup><sub>Jan. 20</sub> after giving some account of the nature of *kefir*, says that he has found it serviceable as a dietetic and therapeutical agent in enfeebled digestive power. It has been of especial value in peritonitis, the convalescent stage of the continued fevers, and the vomiting of pregnancy, and that from ulcer of the stomach. After serious surgical operations he has found it better than either koumiss or milk. Lipsky<sup>598, 35</sup><sub>No. 34, 26; Nov. 8</sub> recommends kefir as a nutritive agent, especially in tuberculosis. He finds also that in certain instances it seems to have a therapeutic action. Thus, in a case of cancer of the alimentary canal, it arrested vomiting, and in a case of tuberculosis removed the diarrhœa. E. F. Brush,<sup>1</sup><sub>July 21</sub> on the other hand, condemns it roundly as a useless, and even dangerous, substance, which produces lactic acid in milk, a substance not wanted there. Levy<sup>6</sup><sub>Apr. 26</sub> says a very good and agreeable imitation of kefir may be made in the following way: Freshly prepared sour milk is briskly shaken up, and then placed in a soda-water bottle together with 2 per cent. of syrup. The mixture is well corked and kept in a warm place for 3 to 4 days, and is then ready for use. It contains about 2 per cent. of alcohol. If needed for use more speedily, a few drops of lemon-juice should be added to the syrup. *Omeire* is a drink used among the natives of South-western Africa, corresponding to koumiss and to kefir. Marloth<sup>116, 9</sup><sub>Dec. '97; Jan. 22</sub> has analyzed it, and found that it contains alcohol in small quantity, and that after 6 to 10 hours' fermentation the casein separates from the milk entirely. Berkan<sup>62</sup><sub>Aug. 1</sub> writes enthusiastically in favor of the use of *beef peptones* in various diseases in which special alimentation was necessary. He considers them more nutritive than milk, and that the stomach will retain them when no other food will be tolerated. There is no dietetic agent which in disease will repair waste as quickly, effectually, and with as little assistance from the digestive organs; and the author expresses

himself as confident that in many of his cases the fatal termination has been averted by the use of peptones of beef. Gauthier<sup>88 90</sup>  
Feb. 14; Sept. has analyzed d'Emilia's "*Trefusia*," which represents the solid constituents of the blood of young, healthy cattle. It is to be employed as a tonic in cases in which cod-liver oil and other tonics were formerly given. It is completely soluble, perfectly absorbed, and agrees with a weak stomach. Digestive experiments show that nearly the whole preparation is converted into peptone. Those who have administered it praise its power in forming new blood-corpuscles. S. Rutgers,<sup>391 319</sup>  
Ed. 34, p. 361; Sept. 22 as a result of careful physiological experiments with different sorts of nourishment, concludes that the animal albumens which we are in the habit of eating could be replaced by the vegetable albumens without changing the nitrogenous balance to any noteworthy extent. They are not, however, so well borne by the digestive tract. With regard to the employment of the *starches*, W. S. Armitage,<sup>6</sup>  
Apr. 28 noticed that in a case of diabetes in which small amounts of other farinaceous foods occasioned sugar in the urine Semolina pudding could be eaten in any amount without this result. He therefore recommends the further trial of this food in diabetes. Considerable has been written on the employment of the *fats* in alimentation. On the ground that the fatty acids are the active principles in cod-liver oil, Lépine,<sup>3</sup>  
June 20 proposes that in those cases where the latter cannot be taken a mixture of butter and of the mixed fatty acids be employed. If prepared carefully in the manner he describes, it is free from odor and disagreeable taste. His experience with it in phthisis has not yet been sufficiently extended to allow him to judge of its value. J. v. Mering<sup>116 19</sup>  
Feb.; Mar. 10 has used an artificial compound of olive-oil and oleic acid in the proportion of 6 to 100, which he uses for internal administration, arguing that the merits of cod-liver oil are derived solely from the amount of the oleic acid contained. Under the name of "*Lipannin*" he recommends a mixture of 100 parts of the acid with 6 of olive-oil, as a substitute for cod-liver oil. This has neither disagreeable taste nor smell, is readily emulsified, may be taken in large quantities for a long time, and is easily digested. He has given it to more than 40 patients with rickets, scrofulosis, diabetes, or phthisis, and all gained in weight and general condition. E. Salkowski,<sup>116</sup>  
May however, claims that in lipanin we can at most obtain the results coming from supplying the system with a large

amount of fat, while in cod-liver oil we have the possibility of gaining a specific action. O. Hauser<sup>114</sup><sub>Bd. 14, H. 3, 5</sub> reports in detail 38 cases of different diseases in which this substance was used instead of cod-liver oil. Accurate statements are given as to its effect on digestion and the increase of weight. The author considers that it is a substance agreeable to take, well borne by the stomach, easily digested and absorbed. He thinks it is in every respect to be preferred to cod-liver oil, and may be given with hopes of success in all those conditions in which the oil has formerly been administered. Gimbert,<sup>3</sup><sub>Nov. 1</sub> has made very numerous observations on the hypodermic injection of olive-oil, and has found that it is innocuous, even in amounts of 50 gram. (3 13) daily, and the weight of the body increased under the treatment. Under the subject of *rectal alimentation*, Jacobi<sup>51</sup><sub>Feb.</sub> speaks of the difficulties attending this method in children, and emphasizes the statement that the rectum can absorb, but not digest. It is therefore necessary that the food be peptonized, or otherwise brought into such a condition that it can be readily absorbed by the rectal mucous membrane.

*Aluminium and Alumen.*—Paoletti<sup>2</sup><sub>Feb. 1</sub> has treated 60 cases of typhoid fever with alum alone and with excellent results. He considers that its virtue lies in its antiseptic power, and that it is indicated in abnormal fermentations in the intestinal canal. Athenstädt<sup>113</sup><sub>Nov. 11</sub> recommends the double salts of aluminium as powerful antiseptics, superior to carbolic acid and sublimate in being strongly disinfecting, though but slightly poisonous. The best of them is the aceto-tartrate, prepared by mixing a 5:100 solution of basic acetate of aluminium with a 2:100 solution of tartaric acid and evaporating to dryness. It crystallizes in shining needles, which smell slightly of acetic acid and are freely soluble in water, but insoluble in alcohol.

*Ammonium.*—Chetan Shah Naug<sup>206</sup><sub>Apr.</sub> calls attention to the well-known but neglected application of chloride of ammonium in neuralgia. In a large number of cases of supraorbital neuralgia he has relieved the pain at once by the use of this drug. Not only was it administered internally, but a small amount of it, finely powdered, was given to be drawn into the nostril of the affected side. Further good results from doses of 20 grains (1.3 gram.) in obstinate neuralgia are reported by Green.<sup>22</sup><sub>Sept.</sub> J. Ringwood<sup>22</sup><sub>Sept. 20</sub>

finds that 30 grains (2 gram.) of chloride of ammonium will generally sober for 15 to 20 minutes persons helplessly drunk, so that they can walk steadily and speak soberly while the stimulating effect of the medicine lasts. He has also obtained the most gratifying results from its continued use in hepatic congestion, suppressed gout, and pelvic cellulitis. W. Stewart,<sup>31</sup> emphasizes a former communication on the value of the chloride in hepatic congestion. The patient should be put to bed, no solid food should be given, and alcoholic stimulants interdicted. If the skin is hot and dry, a few doses of acetate of ammonium should be administered before the chloride is commenced. Twenty grains (1.3 gram.) of the drug are to be given three times a day, while fomentations applied to the seat of pain in the side will also be of service. The symptoms after taking the salt are felt in five to thirty minutes, and consist in a prickling sensation in the hepatic region, a shock, as if something had given away, or of a clawing or similar sensation. Looseness of the bowels is not a contra-indication to the use of the drug. It may be controlled by small doses of mercury and Dover's powder.

*Amyl Hydrate.*—Hydrate of amyl has arisen into considerable prominence since we wrote of it in the ANNUAL of 1888, and its value as a hypnotic is now well established. Dietz,<sup>41</sup> has employed it with advantage in mental disorders, but has often seen headache and various troubles follow its use. In four instances a large overdose was given through neglect to shake the bottle in which the drug was mixed with syrup; deep sleep followed, from which the patients could not be aroused. There was total paralysis and suppression of tactile sensibility, and that to pain, and of corneal reflex. The pupils were dilated, and reacted but slowly to light. Respiration was retarded, superficial, and irregular; the pulse small, soft, and slow; the temperature lowered in 2 cases to 35° C. (95° F.). Artificial respiration was required in the case of 1 patient. During recovery there was confusion of ideas, and inco-ordination of bodily movements. The author likens the toxic effect to that produced by alcohol. He advises that to avoid such accidents the drug be administered in capsules. Gürtler,<sup>4</sup> has administered it to 61 cases of the most different diseases. In addition to the extract of liquorice, used by v. Mering to disguise its taste, he recommends some other corrigant, such as the oil of

peppermint. To children the drug was best administered in capsules. The average dose given by him to adults was 3.5 gram. (54 grains), though often a smaller quantity and sometimes a larger was employed. To 2 children less than a year old he gave 0.2 gram. (3 grains) at a dose, while for older children up to 10 years the amount was increased to 0.6 gram. (9 grains). The desired result was obtained in nearly all cases, *i.e.*, a deep sleep was produced which usually lasted all night, though sometimes only for several hours. In 4 cases a condition somewhat resembling that of alcoholic intoxication was produced before sleep came on. In only a few instances such unpleasant effects as headache, dizziness, and stupidity were complained of, and vomiting did not occur in any case. The drug seemed to have no influence on either the quality or frequency of pulse and respiration. In chronic alcoholism and in the morphia habit the results were excellent. In a case of epilepsy, in which the rest at night was disturbed by violent paroxysms, and in which morphia and chloral gave only partial relief, an entire cessation of the nocturnal convulsions was obtained by the use of amyl hydrate. With full doses, phthisical patients troubled with coughing at night procured quiet sleep lasting until morning. The drug was used in cases of cardiac disease with good results, and with no injurious action on the heart. Its effect in whooping-cough was variable and uncertain. Finally, two children of 6 and 9 months each, with gastro-intestinal catarrh, who cried the whole night, were quieted and put to sleep by 0.2 gram. (3 grains) given in capsules or pills with the food. The author considers that it stands side by side with chloral as a hypnotic, and that it has the advantage of being harmless to the heart. Lehmann<sup>116</sup><sub>Dec. 97</sub> reports 149 observations in 26 insane patients. The usual dose employed was 15 to 75 minims (1 to 5 gram.), with good effects in 83.2 per cent. of the cases, though in mania large doses were required. Paralysis of the insane was benefited, but the insomnia of melancholy was aided to a less degree. The author considers it more efficacious and less unpleasant than paraldehyde, while it does not leave an unpleasant odor on the breath. Avellis<sup>99</sup><sub>Jan. 01</sub> has given more than 300 doses of amyl hydrate to over 40 cases of insomnia occurring in various diseases. It may be exhibited by the mouth or by enema with gum arabic and water, and, unlike chloral, it has no irritative action on the mucous mem-

brane of the rectum. Sleep comes on after 15 to 45 minutes, though often sooner, and occasionally no effect at all is produced. On the whole, it is a reliable hypnotic, if given in sufficient dose; and there are usually no unpleasant secondary effects. Nevertheless, in 1 instance, 2.4 gram. (37 grains) produced a condition like drunkenness in a hysterical woman; and another patient, after taking the same quantity at 1 A.M., felt the next day as though under the influence of a hypnotic. The medicine rather diminished the cough of phthisis, could be used with safety in heart-disease, and was especially valuable in icteric itching. It leaves no bad taste in the mouth, or disagreeable odor on the breath on awaking, such as are noticed after paraldehyde. In no case did the dose need to be increased, even after repeated use. The author greatly prefers it to chloral in all diseases of the circulatory apparatus. A. L. Mason<sup>99 Feb. 16</sup> has used it successfully in a number of cases of insomnia without ill effects, except that a mild intoxication appeared in a few instances. Its action was superior to that of paraldehyde or urethan, and in one case of typhoid fever it produced sleep after morphia, chloral, urethan, and the bromides had failed. Fischer<sup>308 Feb. 20</sup> recommends that it be sometimes combined with morphia, as in the formula: Amylene hydrate, 90 grains (6 gram.); morphia hydrochlor.,  $\frac{1}{4}$  grain (0.016 gram.); aq. destillat., 25 drachms (97 gram.); ext. glycyrrhizæ,  $2\frac{1}{2}$  drachms (10 gram.). Half to be taken on retiring. Or 60 grains (4 gram.) of amyl hydrate with  $\frac{1}{4}$  grain (0.06 gram.) of morphia, suspended in  $12\frac{1}{2}$  drachms (49 gram.) of water and 5 drachms (20 gram.) of mucilage of acacia, may be given per rectum. Laves<sup>4 May 21</sup> tried the drug in 50 patients with various diseases, the number of administrations being over 340. He especially recommends its administration by enema. The normal dose for men is 3 gram. (45 grains) by the mouth, or 3 to 5 gram. (45 to 75 grains) by the rectum. It proved itself efficient in instances of febrile insomnia, phthisis with troublesome cough, acute bronchitis, alcoholic excitement, and neurasthenic insomnia. The intense dyspnoea of cardiac disease was not benefited by it. He believes it to be a very useful hypnotic, which may be given in doses two to three times as large as those of chloral, though it is somewhat less certain in its effects than is this substance, or morphia. Unpleasant secondary effects, as excitement or slight drunken-like stupor were very seldom wit-



nessed, and serious accidents were never observed. In no case did the drug lose its efficiency though given during 3 months, and the deep and refreshing sleep was praised by the patient oftener than in the case of any other hypnotic measures. Buschan<sup>4</sup> administered it 209 times to 11 cases of mental disorder. He considers it a hypnotic of the first order, capable of replacing paraldehyde and chloral, being superior to the first in its less injurious action on the heart, and to the second in the absence of unpleasant odor on the breath. G. Mayer<sup>116</sup> made several hundred trials of amyl hydrate on 15 cases of different diseases, and concludes that it is a reliable and pleasant hypnotic (apart from its disagreeable taste). He found it particularly valuable in respiratory diseases, in which it appeared not only to produce sleep, but to have a decided sedative influence on the cough. In one patient with phthisis it proved itself useful in this respect, after morphia had had but little effect. The usual dose was 3 gram. (45 grains). I have already, in connection with Elwood Kirby,<sup>9</sup> reported the excellent results obtained with amyl hydrate in 85 administrations of it to 18 patients with various diseases. Sleep, lasting through the night with but little or no intermission, was obtained by it in a case of opium habit, in which chloral, bromides, paraldehyde, and hyoscine, given singly or variously combined, had produced but indifferent results. A case of violent alcoholic delirium was put to sleep in 10 minutes by 20 minims (1.32 gram.) of the drug, though on another occasion it was not so efficacious. When there is pain or very troublesome cough, it is not so uniformly successful. The taste is not pleasant, but may be disguised to some extent by liquorice. The drug is more powerful than paraldehyde or urethan, and to be preferred to them, while it should be always chosen in heart-disease in place of chloral, though it is not so strong as the latter. Further experience with the drug convinces me that it is fully equal to sulphonal, and, indeed, superior to it in many respects. Three capsules, each containing 15 minims (1 gram.) are easily taken on retiring, and will almost certainly produce sleep. The effect follows much more promptly than after sulphonal, and it has not the same tendency to produce sleepiness and giddiness on the following day.

*Amyl Nitrite.*—(See *Nitrites*.)

*Antimony.*—A. Jamison<sup>2</sup> made a careful personal study of

213 cases of pneumonia treated in various ways. In 155 of these he was able to follow up the after-history for at least 2 years, and to make a physical examination. He found that in 74 there were traces of an unresolved pneumonia, while it is worthy of note that of the 81 found free of any such signs, 65 had been treated with tartar emetic. On the basis therefore of this after-investigation and on the comparative trial of all methods of treatment, he recommends the administration of  $\frac{1}{20}$  grain (0.0032 gram.) of tartar emetic every hour to young adults, but less frequently to older persons. It relieves the distress of the first stage, and is superior to other remedies in inducing the greatest rapidity and degree of absorption. The treatment should be continued with longer intervals during several days or a week after defervescence. He has seen no instance of vomiting or diarrhoea produced by it. Paczkowski<sup>319</sup><sub>Nov. 13;</sub><sup>5</sup><sub>Nov. 1</sub> reports a series of 532 cases of pneumonia treated with the sulphuret of antimony [Kermes mineral]. The mortality was only 1.69 per cent. He claims that if the treatment is commenced on the second or third day, crisis occurs in 8 to 24 hours. He gives the drug according to the following formula: Kermes mineral, gr. 30 (2 gram.); ext. digitalis, gr.  $2\frac{1}{2}$  (0.16 gram.); opii, gr. 11 (0.71 gram.). Divide into 32 pills; 2 pills are to be taken every 2 hours, and after the crisis every three hours until convalescence is established.

*Anthrarobin*.—This substance, closely allied chemically to chrysarobin, is recommended by Behrend<sup>41</sup><sub>Nov. 21</sub> for use in those diseases in which chrysarobin has been employed. He has applied it in 15 cases of psoriasis, 17 of herpes tonsurans, 2 of erythrasma, and 1 of pityriasis versicolor. The ointment, or, preferably, the tincture may be used, and the effect is enhanced if the application be preceded by washing with spiritus saponis kalinus. His results were, for the most part, excellent; and he concludes that, though it is decidedly weaker than chrysarobin, it has the advantages over it that it can be applied to the face without causing a trace of inflammation and that it is well borne during weeks and months of constant employment. Its action is also much more powerful than that of pyrogallie acid. P. Guttman<sup>99</sup><sub>Mar. 16</sub> confirms Behrend's results in a series of cases. He made a comparative test of the value of anthrarobin and chrysarobin in a case of widely diffused psoriasis. On one part of the body he applied a 10 per cent.

ointment of the latter and on another part a 20 per cent. salve of the former. It was found that the region treated with chrysarobin healed more rapidly than the other, though both drugs proved themselves efficacious. O. Rosenthal<sup>60</sup><sub>Mar. 10</sub> had in one case applied anthrarobin to the head, and produced a distinct red staining of the hair.

*Argentum (Silver).*—T. W. Bennett,<sup>6</sup><sub>Feb. 4</sub> reports an instance of intense pain lasting three days caused by instilling into the ear a few drops of a 20 per cent. solution of nitrate of silver for granulations of the tympanic cavity. There were also frequent attacks of dizziness, and absolute deafness developed, lasting several days.

*Antipyrin.*—The amount written concerning antipyrin and the number of different diseases for which it has been recommended during the year 1888 would seem to indicate that it is almost a panacea. Such an opinion of it has very properly been deprecated by Fraty<sup>82</sup><sub>June 9</sub> and other writers as tending to throw doubt on the drug's real value. It is, nevertheless, a remarkable fact that in a host of pathological conditions—all more or less allied, it is true—it has proved itself of great value. The greatest objection to it is that it is a patented article, in the hands of a monopoly, whose interest it is to maintain the high price at which it sells. As its chemical name, Dimethyloxychinizin, is rather inconvenient, the term "analgesine" has already been proposed for it, in order to avoid the copyrighted term. Nicot<sup>139</sup><sub>Mar.</sub> suggests "paradyne," i.e., "against pain." Neudörfer,<sup>2</sup><sub>Jan. 21</sub> likewise suggests a change of name, using as synonyms with the original term the words "antiseptin" and "anodynin." Reports on the employment of the drug as an *antipyretic* appear from the pens of various writers. G. W. Barr,<sup>53</sup><sub>Jan. 22</sub> has made a careful comparative study of the antipyretic action of antipyrin and acetanilid on himself, and found that the effects of the first are felt sooner but last a shorter time. Bard<sup>211</sup><sub>Jan. 15</sub> admits that antipyrin is undoubtedly superior to other internal antipyretics in typhoid fever, but considers it by no means the equal of the cold bath. The temperature rises more quickly, and as tolerance is soon established it becomes necessary to increase the dose. Demme<sup>365</sup><sub>Oct. 27, 28, 29, 30, 31, 1888</sub> prefers antipyrin to thallin for the treatment of febrile diseases in children, as it reduces temperature more decidedly and for a longer period, and with less disturbance to the system at large. Though it diminishes the fever of erysipelas, it

has no specific action on the disease itself. T. L. Hatch<sup>105</sup><sub>June 15</sub> has had excellent results with doses of  $\frac{1}{4}$  to 1 grain (0.016 to 0.064 gram.) in the fevers of babies not yet 4 months old. C. Billet<sup>243</sup><sub>Mar.</sub> details several cases of typhoid and remittent fevers in which he used the drug for its antipyretic effects. The doses employed were 3 to 4 gram. (45 to 60 grains), since with a smaller amount he obtained but little result. It is safe to say that few physicians find so large a quantity necessary to produce the desired fall of temperature. C. A. Brooks<sup>207</sup><sub>May</sub> has been well pleased with the antipyretic action of antipyrin in typho-malarial fever, its superiority to salicylate of soda being shown by the absence of the gastric irritation which the latter produces. He follows the method of continuous administration, giving 8 to 10 grains (0.52 to 0.65 gram.) every 3 hours. W. H. Magee,<sup>492</sup><sub>Feb. 11</sub> in speaking of the antipyretic action of the drug, says he has administered it in over 150 cases of typhoid fever in doses of 10 to 12 grains (0.65 to 0.78 gram.) every hour until 3 to 4 doses have been taken, and has yet to see the first instance of collapse follow its use. Mollière,<sup>211</sup><sub>Feb. 19,</sub> <sup>77</sup><sub>May</sub> has attained much less favorable results with antipyrin in typhoid fever than with other methods of treatment. Oliver,<sup>6</sup><sub>May 5</sub> on the other hand, considers it of great service in this disease. Suñer,<sup>503</sup><sub>Nov. 2</sub> found it to quiet the pulse, relieve the stupor, reduce the fever, and act as a diaphoretic in a case of cystitis and nephritis. Cotton<sup>58</sup><sub>Nov. 17</sub> speaks well of its antipyretic powers and its action in controlling hectic. The drug is still given with the belief that it has a specific action in rheumatism, apart from the simple relief of pain. Demme,<sup>306</sup><sub>Oct. 27, N. Y.</sub> reports several cases of acute rheumatism in children treated by antipyrin, from which it would appear that the drug acts readily upon the disease, though somewhat less promptly than salicylate of soda. R. Hirsch<sup>116</sup><sub>Oct.</sub> says that it often seems to act specifically in acute and subacute rheumatism, after salicylic acid has failed. B. Marshall,<sup>77</sup><sub>July</sub> deems it a safe and efficient antipyretic, which is more or less curative in rheumatism and in the first stages of all fevers not of septic origin. As a result of some trials with antipyrin N. S. Davis<sup>130</sup><sub>Dec. 75</sub> concludes that it is as efficacious as salicylate of soda, while it produces less nausea and no ringing in the ears. It is, he thinks, especially applicable in acute cases. H. Muller also obtained a well-marked antirheumatic action with it. For the relief simply of the pain of rheumatism, as an analgesic in

many other affections, as an hypnotic, and as a sedative and nerve in the treatment of various nervous affections antipyrin has been very largely used during the past year, and numerous publications have appeared concerning it. C. Berdach<sup>84</sup><sub>Mar. 10</sub> gives a short report of each of 24 cases of various painful diseases, in which the hypodermic injection of antipyrin, made at the seat of the greatest tenderness, promptly relieved the pain. Among the diseases reported are included acute articular rheumatism, sub-acute rheumatism, tic douloureux, pleurisy, sciatica, carcinoma, tabes dorsalis, lumbago, heart-disease, asthma, headache, intercostal neuralgia, etc. In no instance was there the slightest unpleasant constitutional effect witnessed, abscess was in no case produced, and in very few cases was there even an induration caused by the injection. Bloch,<sup>100</sup><sub>Dec. 20, '97</sub> in describing some new applications of antipyrin, narrates a case of spasmodic rhinitis [hay fever] of which the patient had had two attacks a day for two years, and in whom recovery began on the day when the treatment with antipyrin was instituted, although other remedies had been unavailing. Another patient was a nervous subject who had suffered from an almost uncontrollable desire to sleep in the afternoons. This tendency began after an attack of typhoid fever 2 years before, and was so irresistible that it interfered with the patient's business. On the day when antipyrin was first administered the somnolence disappeared, and, under the continuance of the drug for a time, complete recovery took place. G. S. Ryerson<sup>137</sup> has used it with great success as an anodyne in painful affections of the eye. Twenty grains (1.3 gram.) repeated at intervals of 3 hours had almost magical effects. W. F. Wright<sup>137</sup> has found it very efficacious in 15-grain doses (1 gram.) in hemi-crania, sciatica, ovarian neuralgia, muscular rheumatism, and similar painful affections. The cephalalgia associated with insomnia usually met with among professional men and overworked mothers is more promptly relieved by it than by other drugs usually employed. The hysterical knee and hand and hysterical convulsions will yield to this treatment when other means have failed. La Guardia<sup>456</sup><sub>Feb. 20; Apr. 74</sub> publishes an interesting case of intercostal neuralgia following herpes zoster, where the pain entirely ceased on the day after three grains (0.19 gram.) of antipyrin had been given. Another case of pain from syphilitic nodes on the tibia, was, on

two occasions, relieved by 3 grains (0.19 gram.) of the drug daily. J. Z. Scott<sup>202</sup><sub>Mar. 10</sub> has given it with success in quite a number of cases of migraine. He found it invaluable in large doses in a case of infantile convulsions with high fever. He makes the statement, also, that children require proportionately larger doses than adults do; and in this I think he is probably correct. E. L. Fiske<sup>99</sup><sub>July 12</sub> has found it of use as an analgesic or hypnotic in 26 cases. Headaches of a neuralgic nature were benefited, but those depending on digestive derangements were unaffected. Headache, flushings, etc., at the time of the catamenia, and intercostal neuralgias and joint pains were favorably influenced. In some cases sleep came on, probably because the pain was removed; while in others it seemed actually to induce sleep. One patient who had used morphia for headaches obtained in antipyrin a satisfactory substitute. The writer at first gave larger doses, but afterward found that 4 to 5 grains (0.26 to 0.32 gram.) repeated every half hour for 3 to 5 doses was of equal benefit. Hatch<sup>105</sup><sub>June</sub> also considers the drug a valuable agent in some cases of insomnia, and in a case of puerperal mania with high maniacal excitement large doses hypodermically induced tranquil sleep for several hours. C. Milne<sup>82</sup><sub>Feb. 4</sub> adds his testimony to its value in allaying pain and producing sleep, and it has with him almost entirely supplanted opium for these purposes. He also deems it an excellent remedy for after-pains in labor. Sarda<sup>67, 99</sup><sub>Mar. 20; May 2</sub> finds antipyrin to be especially useful in acute rheumatism, migraine, neuralgias of recent date, and in all pains of a paroxysmal character. In 40 cases it proved itself superior to acetanilid for these affections, but in combating phenomena of nervous excitation it was of little value. G. C. Kingsbury<sup>2</sup><sub>Dec. 24, '97</sub> reports 20 cases of migraine treated with antipyrin. Several of these were apparently hopeless cases, who had previously found all drugs useless, but 8 grains (0.52 gram.) of the drug in water or lemonade, repeated every half hour for 2 to 3 doses, the patient meanwhile lying down, failed in no instance to cure. An occasional antipyrin powder will also prevent the attacks. W. H. R. Forsbrook<sup>6</sup><sub>Dec. 10, '97</sub> has prescribed it in 100 cases of migraine, and has found that in 15 grains (1 gram.) doses every 20 minutes three times consecutively it rarely fails to entirely remove the characteristic symptoms. N. E. Davies<sup>6</sup><sub>Dec. 31, '97</sub> has found its effects marvelous in the cases of migraine in which he has tried it. He gives

10 grains (0.65 gram.) every hour for 2 to 3 doses, and then at intervals of 6 hours for a day or two to prevent a recurrence of the attack. H. Humfreville,<sup>72</sup> in the course of an extended practice, finds no remedy give so great satisfaction as antipyrin in the treatment of neuralgias, especially the intercostal and facial. He has also had good results with it in asthma, phthisis, and the pains of parturition. C. Billet,<sup>28</sup> reports his favorable experience with the analgesic action of antipyrin in different painful affections, and K. J. M. Loeb,<sup>113</sup> has used it in some cases of neuralgia with good results, though in others it was valueless. P. R. Egan,<sup>50</sup> reports a number of cases characterized by pain in different parts of the body relieved by 15-grain (1 gram.) doses of antipyrin. He thinks it loses its effects when frequently used. Caravias,<sup>57</sup> has also found antipyrin a very generally useful analgesic, whether given by the mouth or hypodermically. T. M. Lloyd,<sup>40</sup> has found hypodermic injections of it useful in the few cases of sciatica and intercostal neuralgia in which he tried them. Grandclément,<sup>1</sup> has found subcutaneous injections of antipyrin in the temporal region prove quite beneficial in all diseases of the eye in which there was pain or spasm. The dose was 4 grains (0.26 gram.) in 10 drops of distilled water, to which was added  $\frac{1}{12}$  grain (0.005 gram.) of cocaine. R. Hirsch,<sup>116</sup> has not had very favorable results from the exhibition per os of antipyrin for pain, except in acute and subacute rheumatism. When used hypodermically, however, he found it so serviceable in many sorts of pain that it largely took the place of injections of morphia. A 50 per cent. solution was employed, and the injection made near the seat of pain, when this could be sufficiently localized. J. Hess,<sup>4</sup> details 15 cases of pain in rheumatism, neuralgia, tabes, and gout, treated by injecting a 50 per cent. solution of antipyrin deep into the muscles. The drug proved itself a useful analgesic, seldom failing to give relief, and efficient in central as well as peripheral affections. The duration of this relief varied, being longest in muscular rheumatism and transitory in neuralgia. It was doubtful whether there was any specific action evidenced in rheumatism. F. Merkel,<sup>34</sup> gave 138 injections to 75 patients with different diseases, the object being to relieve pain. Success attended the procedure in 80 per cent. of the cases. The injection should be made deep into the subcutaneous connective tissue, but is always a very pain-

ful procedure. It is to be recommended in rheumatism confined to one joint, in muscle-pains, sciatica, and especially in the thoracic pain of phthisical patients. The drug can never generally supplant morphia, though at times it is to be preferred to it, as in some cases of pleuropneumonia. A. Wolff<sup>116</sup><sub>June</sub> has employed the hypodermic method in a large number of cases, some of which he reports. He recommends it in muscular rheumatism, for the thoracic pains of phthisis, in neuralgia, asthmatic attacks, and in painful conditions in which it is desired to avoid morphia. The amount used was usually 0.5 gram. ( $7\frac{1}{2}$  grains), dissolved in an equal quantity of water. Cihak<sup>283</sup><sub>No. 26</sub> found hypodermic injections of 0.25 gram. ( $3\frac{3}{4}$  grains) very useful in stilling various sorts of pains. T. Balzer and A. Klumpke<sup>24</sup><sub>Jan. 29</sub> have used it hypodermically in 50 per cent. solution for the relief of pain, and generally with benefit. Günther<sup>69</sup><sub>May 17; Aug. 5</sub> gave a deep injection of a strong solution of antipyrin to a patient with a recent fracture, and was enabled to apply the first dressing without the slightest muscular contraction. He has found the drug of service in laryngeal phthisis with cough and loss of sleep. B. Marshall<sup>77</sup><sub>July</sub> says that as an analgesic it stands pre-eminently above all others, and appears to be a specific in some diseases, as in gout and migraine. He has used it in several cases of gout with great success, as under its continued administration the attacks were cured more certainly than with colchicum, and the diathesis so modified that the disease seemed to have less disposition to recur. He reports, too, a case of carbuncle, and one of cerebrospinal meningitis, in which the processes seemed to be cut short by full doses of the drug. Bahnson<sup>43</sup><sub>July</sub> has used it with success in relieving pain, even in cases where opium had failed. He has also obtained favorable results with it in spasmodic croup. G. N. Stephen<sup>82</sup><sub>June 30</sub> has found it of the greatest value in epidemic cerebrospinal meningitis. It allays the pains, influences the course of the disease, and quells the nerve-storms, which are one of the causes of death. He advises three doses of 15 grains (1 gram.) each, given in the course of an evening and night. A. Jamieson<sup>6</sup><sub>May 28</sub> reports a case of very severe dysmenorrhœa, one of persistent and severe lumbar pain, and one of obstinate temporal neuralgia cured by antipyrin. In all three cases there was a decided slowing of the pulse. W. D. McKim<sup>60</sup><sub>July 28</sub> reports a case of crural and sciatic neuralgia, to whom thirty-seven injections



of antipyrin were given at different times with marked relief of pain. Nicot<sup>139</sup><sub>Nov</sub> considers the hypodermic administration of antipyrin very valuable in relieving pain and has never observed any evil after-effects. He has frequently seen the hemicrania of women disappear after a single injection of a 5 per cent. solution. Laget<sup>77</sup><sub>May</sub> reports a case in which the pain of abortion was controlled by enemata of antipyrin, though the uterine contractions were not interfered with. M. Perceval<sup>6</sup><sub>Nov. 17</sub> has had excellent results with full doses in 24 cases of laryngismus stridulus. Sielski<sup>588</sup><sub>Nov. 10; July 2</sub> has given it in 3 cases of labor and 1 of abortion, and regards the drug as in many respects superior to all other means which have yet been recommended to relieve the pains of labor. He gave 1 gram. (15 grains) and repeated it, if necessary, in 2 hours. The results were excellent, the pain ceasing almost entirely, though the uterine contractions continued unaffected. H. G. Norton<sup>19</sup><sub>Feb. 22</sub> finds that many cases of dysmenorrhœa can be relieved in 30 minutes by 3 to 5 grain (0.19 to 0.32 gram.) doses of antipyrin, repeated as may be required. In one case the relief was greater than that afforded by opium and belladonna suppositories, and without the unpleasant after-effects of these drugs. He has also found it very useful in trigeminal neuralgia, even in cases in which other remedies had proved unavailing. T. J. Bokenham<sup>15</sup><sub>Apr.</sub> has used antipyrin in over 100 cases of headache of different forms. In migraine the results have been very good, and doses larger than 4 grains (0.26 gram.) were never required. In headaches due to debility the action was not so satisfactory, though temporary relief was obtained in a large number of them. Antipyrin has been tried extensively in the treatment of epilepsy and chorea. Bokenham<sup>15</sup><sub>Apr.</sub> details its action in twenty cases of epilepsy, in most of which the results were very encouraging. He has further used it in 10 cases of chorea in doses of 15 to 25 grains (1 to 1.6 gram.), but the results were by no means so hopeful. Gautier<sup>35</sup><sub>May 10</sub> saw the attacks disappear in 3 cases of epilepsy treated with it. Moncorvo<sup>35</sup><sub>May 21</sub> reports in detail 2 cases of chorea in children cured by the administration of very large doses, and Oliver<sup>6</sup><sub>v. 1, p. 287</sub> gives an instance of recovery from chorea after various other remedies had failed to benefit. Lemoine<sup>55</sup><sub>Dec. 24, 97</sub> concludes that antipyrin is inert in the majority of epileptics. Those who may be benefited are: (1) cases in which epileptic paroxysms are induced by

menstruation; (2) cases in which the attacks are due to the irritation of intestinal parasites; (3) cases which suffer from neuralgia and migraine. Thirty grains (2 gram.) a day is sufficient in the majority of cases, and may be kept up for a long time without injury; but as tolerance is liable to be established, it is best to reserve it for the period when the crises come on. It is superior to bromide of potash in these cases. Fraty,<sup>6</sup><sub>Mar.3</sub> as a result of his experience with it in 20 cases of epilepsy, believes the drug has an influence over some instances, but must be given in large doses, 3 to 8 gram. (45 grains to 3 2) daily. In a large number of patients a feeling of general malaise is produced, and the treatment has to be abandoned. The moderating effect is transitory, and the attacks recur more violently than ever on the cessation of the treatment. Ollivier's<sup>73</sup><sub>Feb.19</sub> results with it in chorea have not been encouraging. Legroux<sup>14</sup><sub>Dec.29, 97</sub> considers antipyrin one of the most rapid, sure, and inoffensive means of treating chorea. From 6 days at least, to 27 days at most, were required in his cases to cure a malady whose duration is usually very long. Children require as much as 3 gram. (45 grains) in 24 hours in order to obtain the therapeutic effects. Boussi,<sup>6</sup><sub>Feb.19</sub> administered to a child of 8 years with chorea 30 grains (2 gram.) of antipyrin on the first day, divided into 4 doses. This was repeated on the next day but one, and with good results immediately. Mahnert<sup>113</sup><sub>Mar.28</sub> has used antipyrin successfully in tetanus, chorea, spasm of the glottis, cardiac asthma in aortic insufficiency, and in neuralgias, including the pains of tabes. In a case in which paralysis agitans was combined with tabes the tremor ceased for 6 to 8 days each time an injection of the drug was given. B. Hajós<sup>512 116</sup><sub>No.15, May</sub> tried the drug hypodermically in a case of chorea with complete recovery in a short time. He also obtained good results with this method in intercostal neuralgia, lumbago, and muscular rheumatism. The value of antipyrin in whooping-cough has for the most part been confirmed by those who have reported their experience with it, though there are a few dissenting voices. D. B. Cotton<sup>53</sup><sub>Nov.17</sub> found the results excellent and prompt in 4 bad cases, while in several incipient ones the effect was so immediate and so marked that the author could not doubt that the disease was cut short by the drug. W. N. Sherman,<sup>19</sup><sub>Jan.26</sub> has had some good results from antipyrin in pertussis, in the few cases in which he has tried it.

Geffrier<sup>25</sup><sub>Oct. 15</sub> reports favorable results with antipyrin in a few cases, and Genser<sup>3</sup><sub>Apr. 15</sub> treated 120 cases with it, the average duration of the treatment being  $24\frac{1}{2}$  days, and the attacks diminishing rapidly in intensity and number. He gives daily a number of decigram. ( $1\frac{1}{2}$  grains) equal to the number of years the patient is old, though this dose can be doubled without inconvenience to the patient. Dubousquet-Laborderie<sup>67</sup><sub>May 15</sub>, <sup>26</sup><sub>June</sub> used it in 15 cases of whooping-cough and found that the spasm is rapidly calmed and the period of decline soon reached. The drug, he says, is not dangerous, but it is necessary to see to the purity of the preparation. He gives doses of 0.30 to 1 gram. (5 to 15 grains) to children under 2 years of age, and 1 to 4 gram. (gr. 15 to 31) to those above it. I have myself reported<sup>80</sup><sub>Feb. 15</sub> 15 cases treated with it with marked success, the drug proving inefficient in only one instance. In some cases the effects were really astonishing, and this was especially the fact when treatment was commenced in the early stages, at a time when medication is generally useless. In many instances the disease appeared to be aborted, and in others it was rendered so mild as to be insignificant. E. C. Rothrock<sup>176</sup><sub>Mar.</sub> finds it useful in whooping-cough and in painful uterine affections among other diseases. As it is eliminated by the kidneys it has also proved of service in acute mucocystitis. The only dissenting statement as to the value of antipyrin in whooping-cough is that of Philbert<sup>24</sup><sub>Mar. 15</sub> and Gassicourt,<sup>24</sup><sub>Mar. 15</sub> who have obtained no good results with it in this disease. Among the more unusual applications of antipyrin may be noticed the report by Genner,<sup>62</sup><sub>Feb. 1</sub> who gave it to a gentleman of 60 years with diabetes, for whom other remedies had been used with only partial success; 45 grains a day were employed, and after 10 days sugar had entirely disappeared. Dujardin-Beaumont<sup>61</sup><sub>July</sub>, also has taken advantage of its action in diminishing the excretion of urine, and has given it to cases of diabetes, lessening the amount of urine and of sugar eliminated, and Goellner<sup>224</sup><sub>July 7</sub> reports a similar case. Gautier<sup>35</sup><sub>May 10</sub> reports 3 cases of diabetes treated with it, but without any influence on the amount of sugar. Two cases of exophthalmic goitre were greatly benefited by the drug. Huchard,<sup>61</sup><sub>July</sub> also found it of value in diminishing the amount of urine in a case of polyuria. Its effects in tic douloureux are remarkable, but in sciatica and intercostal neuralgia it oftener fails than succeeds. P. O. W. Hailey<sup>206</sup><sub>Sept.</sub> recommends it in small doses

to prevent sweating, and has also treated successfully a case of acute superficial dermatitis by local subcutaneous injections of 1 grain (0.065 gram.). He believes the drug to have a powerful action on the vasomotor system. Salemi,<sup>67</sup> reports a case in which it was desired to dry up the secretion of milk. After other remedies had proved useless, antipyrin in small doses promptly succeeded. As regards the value of antipyrin in sea-sickness, S. A. Fisk,<sup>90</sup> reports a case in which this affection was entirely prevented apparently by the ingestion of 10 grains (0.65 gram.) of antipyrin three times a day. Dupuy,<sup>22</sup> treated 11 persons about to take a sea-voyage by administering 2 to 3 gram. (30 to 45 grains) daily for 2 to 3 days, none of those thus treated suffering from sea-sickness. On the other hand, Rollet,<sup>22</sup> tried the alleged virtues of antipyrin on 120 persons at sea with him. As soon as the vessel began to roll and pitch, the passengers each took 15 to 45 grains (1 to 3 gram.). The drug proved itself without value, as only 15 of the 120 were able to appear at dinner, and most of them continued to suffer until they landed. Thör,<sup>2</sup> considers antipyrin an excellent substitute for the bromides in nocturnal seminal emissions, especially as it is free from the danger of producing acne. In 7 cases the emissions were prevented by the injection of  $\frac{1}{2}$  to 1 gram. ( $7\frac{1}{2}$  to 15 grains) before retiring. The sexual neurasthenia of Beard is also well treated by it in doses of 1 to 2 grams ( $7\frac{1}{2}$  grains) a day. W. T. Brooks,<sup>2</sup> has found antipyrin useful in patients with spermatorrhœa, the result of earlier masturbation. It has also been serviceable in the bilious headache of those of full habit. Byvalkevitch,<sup>139</sup> says that antipyrin in doses of 20 to 80 grains (1.3 to 5 gram.) arrests hæmoptysis, even when of large amount, and when other hæmostatics have failed. Mahnert,<sup>113</sup> saw hæmoptysis cease after the employment of antipyrin in a case in which other remedies had proved futile. He has also found a  $\frac{1}{2}$  per cent. solution used locally to be of advantage in cystitis and gonorrhœa. Various other reports are given of the *topical* employment of the drug, chiefly for the arrest of hæmorrhage and as an antiseptic. Hénocque,<sup>3</sup> in 1884 ascribed to it a hæmostatic action, and since then he has observed the same result of its application in many cases. He employs it in powder, solution, or ointment. For epistaxis it may be used by insufflation, and in uterine hæmorrhage it may be

applied on a tampon. During operations a 5 per cent. solution is a convenient strength for bathing the bleeding surfaces, but for deep cavities a 20 per cent. solution is better. It is a convenient practice to soak starch, cotton, or thick filter paper in a strong solution of the drug, then dry it, and apply to the wounded surface. An ointment of 2 parts of antipyrin in 3 of vaseline applied in a case of ulcerating cancer of the breast and changed only twice a week puts an end to suppuration and the characteristic odor. Cehak<sup>283</sup><sub>Feb. 28</sub> obtained relief of pain from uterine cancer by the application of equal parts of antipyrin and starch. Moutard-Martin<sup>3</sup><sub>Jan. 18</sub> also has found it useful as a local application, especially in the rebellious epistaxis of typhoid fever. As an internal medication for hæmorrhage it appeared to him to be without value. Bilhaut<sup>3</sup><sub>Feb. 4</sub> has employed a 5 per cent. solution as a hæmostatic and antiseptic in 2 cases, and with such good results that he does not doubt that it would prove very generally useful. W. M. Powell<sup>143</sup><sub>Mar.</sub> has tried the local action of antipyrin in 2 cases of quite severe hæmorrhage, and with results which were prompt and entirely satisfactory. Olichow<sup>69</sup><sub>Jan. 26</sub> obtained excellent results with inhalations of a 10 per cent. watery solution in 6 cases of hæmoptysis, the hæmorrhage becoming less on the first day of treatment, and ceasing entirely on the next. F. W. Hinkel<sup>1</sup><sub>Oct. 29</sub> details cases illustrating the employment of antipyrin in the nasal passages, and concludes that a solution of it sprayed into the nose possesses hæmostatic properties, and that in the strength of 4 per cent. it gives temporary relief to engorgement of the turbinated bones. It is most effective when the element of irritation exceeds that of inflammation. It is superior to cocaine in not producing numbness and in the absence of unpleasant constitutional effects, but inferior to it in that it causes more or less smarting. An adverse report is that of Glinsky<sup>2</sup><sub>May 19</sub>, who has tried antipyrin for hæmorrhage with unsatisfactory results, applying it in powder or on plugs wet with a 5 per cent. to 10 per cent. solution. It, however, markedly accelerated the healing of indolent leg-ulcers when applied in powder. Nicot<sup>139</sup><sub>Apr.</sub> considers a 5 per cent. solution more efficient than carbolic acid, but the high price is an obstacle to its general employment.

*Antipyrin, Administration of.*—Regarding the methods of administering antipyrin, which have not already been referred to, Vulpius<sup>742</sup><sub>Jan. 21</sub><sup>80</sup><sub>Mar. 16</sub> calls attention to the fact that solutions of antipyrin

cannot be preserved by the addition of carbolic acid, on account of the fact that antipyrin and carbolic acid unite to form a compound which is only soluble in water to the extent of 1 to 2 per cent. The acid, therefore, cannot be employed to sterilize and preserve solutions for hypodermic use. H. du Fougerey<sup>100</sup><sub>Mar. 2</sub> says that the severe though temporary pain of the hypodermic administration of antipyrin is the greatest objection to this method of its employment. To obviate this he fills his syringe three-quarters full with the antipyrin solution, and then draws into it a solution of cocaine, containing about  $\frac{1}{4}$  grain (0.016 gram.). Given thus in a region where the skin is lax, the injection is painless. If the cocaine be first introduced into the syringe, and then the antipyrin, no such good result is obtained. Von Brincken<sup>116</sup><sub>July, Sept. 1</sub> says that the subcutaneous injection of antipyrin can be rendered painless by giving an injection of  $\frac{1}{16}$  grain (0.004 gram.) of cocaine 3 to 5 minutes before. Another writer<sup>22</sup><sub>Mar. 14</sub> calls attention to the importance of administering the drug with or immediately after food, to avoid the irritation of the stomach which is otherwise produced. R. L. Batterbury<sup>2</sup><sub>Oct. 27</sub> recommends coffee as almost entirely disguising the taste of antipyrin.

*Antipyrin, Toxicology of.*—Bremer,<sup>82</sup><sub>June 2</sub> in commenting on a case of death following the ingestion of a mixture of sweet spirits of nitre and antipyrin, says that he found that the green precipitate which the union of these substances forms had no poisonous action whatever on rabbits. He concludes that death was accidental, and in no way concerned with the remedies employed. It is clear, I think, that the substances are chemically incompatible, and should not be administered together. The more general the use of antipyrin becomes, the more does the literature of its toxicology increase, and the more do we learn that, though an invaluable remedy, it must always be used with caution. It is capable of producing very unpleasant secondary effects, and there are contra-indications for its employment. Eloy,<sup>35</sup><sub>Mar. 1</sub> after reviewing the cases in the literature in which dangerous symptoms or death have followed the use of antipyrin, concludes that it should not be given in antipyretic doses to fever patients, because it interferes with the action of the kidneys, and that in febrile conditions complicated by nephritis (pneumonia, typhoid fever, tuberculosis, etc.), it is contra-indicated. It must be avoided in true angina pectoris, because it

acts injuriously on the heart-muscle, and there is always danger of cardiac dilatation in this affection. In the neuralgic form of angina pectoris there is no reason for preferring its hypodermic use to that of morphia. Weakness of the circulation, too, is a contra-indication to antipyrin. Huchard,<sup>61</sup><sub>July</sub> also warns against its employment in all cases in which the kidneys are diseased, since its elimination is interfered with, and toxic effects might arise. Arteriosclerosis should not be treated by it, even when the kidneys are not affected. Rapin,<sup>2</sup><sub>Oct. 4</sub> saw a case in which 1 gram. (15 grains) of antipyrin produced alarming toxic symptoms. D'Espine,<sup>2</sup><sub>Oct. 4</sub> saw grave toxic symptoms in children with pneumonia, and has abandoned the use of the drug in this disease. Mayor,<sup>2</sup><sub>Oct. 4</sub> does not consider a dose of over 0.5 gram. ( $7\frac{1}{2}$  grains) safe, and this should not be repeated for 4 hours. J. L. Prevost,<sup>2</sup><sub>Oct. 6</sub> would entirely avoid hypodermic injections of it, on the ground that they produce decomposition of the blood. Grognot,<sup>67</sup><sub>Aug. 15</sub> reports a case of œdema of the face with dryness of the throat and great dyspnœa, rapidly developing after a dose of 15 grains (1 gram.). L. Mazzotti,<sup>507</sup><sub>June</sub> <sup>78</sup><sub>Sept. 1</sub> relates an instance of papular exanthema produced by hypodermic injections. Péter,<sup>14</sup><sub>Apr. 25</sub> describes serious results following the use of antipyrin. In the first case, one of typhoid fever, epistaxis followed its ingestion for 2 weeks, and the patient died of cachectic purpura and debility. In another case of typhoid fever it produced uræmic symptoms, eclampsia, and death. It is possible, however, that these symptoms were not due to the action of the medicament. J. M. Loeb,<sup>113</sup><sub>Jan. 22</sub> reports a case of typhoid fever in a child of 6 years, to whom 0.25 gram. ( $3\frac{3}{4}$  grains) had been given every  $\frac{3}{4}$  hour for four doses. The temperature fell to 35° C. (95° F.), and the child became cold, cyanotic, and unconscious. Whitehouse,<sup>26</sup><sub>Apr. 2</sub> gave  $7\frac{1}{2}$  grains (0.5 gram.) to a young child. In 2 to 3 minutes there was severe intestinal pain, and an abundant eruption of the urticaria appeared. The child remained in danger until a subcutaneous injection of atropia was administered. U. K. Dutt,<sup>2</sup><sub>May 25</sub> found that on two occasions a dose of 5 grains (0.32 gram.) produced an intense burning, itching, tingling sensation over his whole body, though no rash was visible. J. C. Robb,<sup>6</sup><sub>July 25</sub> gave 15 grains (1 gram.) to a patient with migraine, with relief of the headache, but with the production of violent sneezing, catarrh from eyes and nose, tightness about the throat, loss of voice, and difficulty in breathing. A somewhat

similar case is reported by S. Peters.<sup>60</sup> After the ingestion of 10 grains (0.65 gram.) of the drug the patient was attacked by an intense burning in the nose, mouth, eyes, ears, and throat, and a peculiar "snapping" in her head, making her almost frantic, and causing her to run up and down the room screaming. Violent and repeated sneezing then commenced, accompanied by a copious, watery discharge from the eyes and nose. For several hours she was unable to breathe through the nose. The most violent part of the process continued for about 10 minutes, but recovery was not complete until the next day. Mollière<sup>211</sup> has seen alarming symptoms follow the administration of antipyrin, and holds the remedy responsible for death in two of his cases. Barr<sup>6</sup> reports a case of puerperal fever in which collapse followed the ingestion of 15 to 30 grains (1 to 2 gram.) in two doses, and the patient died in syncope 32 hours after taking the medicine. Wilson<sup>24</sup> has a scarlatiniform eruption produced by it in 2 or 3 instances, and von Jaksch<sup>113</sup> says that other eruptions, as that of measles, assume a hæmorrhagic character while antipyrin is being given. Taylor<sup>2</sup> saw intense coryza, great irritability of the larynx, and cough on two occasions after 8 grains (0.52 gram.) had been taken. O. Jennings<sup>73</sup> reports a case of the deleterious action of antipyrin in a patient to whom 2 to 5 gram. ( $3\frac{1}{2}$  to  $32\frac{1}{4}$ ) had been administered daily during 8 days, these consisting in a disseminated erythematous eruption, swelling of the face, coldness of the extremities, conjunctivitis, acceleration of the pulse, and a slight lowering of the temperature. He recommends that in such accidents belladonna be administered. In another instance large doses of antipyrin produced very marked confusion of mind, which was followed by a severe attack of gastroenteritis. In still another instance there was swelling of the body and a wide-spread macular eruption unattended by itching. The interior of the throat also became so swollen that there was danger of suffocation. Chéron<sup>108</sup> reports a case of typhoid fever in which the very high temperature was uninfluenced by other means employed, and 1 gram. (15 grains) of antipyrin was finally given in 2 doses 5 hours apart. The temperature immediately began to fall, and in spite of artificial warmth at last reached 34.5° C. (94° F.), while cramp, difficulty in speaking and hearing, and cloudiness of mind developed. On another occasion the patient again showed evidences of collapse



after taking 0.4 gram. (6 grains) divided into 8 doses 3 hours apart. W. A. Sturge<sup>2</sup><sub>Feb. 1</sub> reports a case in which just 5 minutes after taking 5 grains (0.32 gram.) of the drug for migraine the patient began to sneeze violently, the face and eyes became suffused, tears flowed, quantities of mucus were discharged from the nose, respiration was labored, there was a sense of suffocation, a violent cough, and profuse sweating. After about half an hour a thick crop of urticaria developed on the inside of the thighs and spread over the abdomen. A strong coppery taste and smell was experienced, both intermittent. There was also a loud ringing in the ears, and a full and quick pulse. In three-quarters of an hour the symptoms began to abate, and in 4 to 5 hours had disappeared entirely. Alex. Macdonald<sup>2</sup><sub>Feb. 11</sub> reports another instance of widespread and copious urticaria occurring in a case of typhoid fever in whom three doses of the drug had been given daily for 12 days, and covering every part of the body except the face. Hardy<sup>3</sup><sub>Feb. 22</sub> has seen it produce a scarlatiniform eruption and loss of appetite which had lasted 12 days at the time when the case was reported. Guttman<sup>77</sup><sub>May</sub> found antipyrin give rise to œdema, excitement, amaurosis, pruritus, and urticaria, in one case, and in another to palpitation, cyanosis, and dyspnoea. Oliver<sup>6</sup><sub>May</sub> warns against the danger of collapse, and has seen a herpetic eruption caused by it. R. L. Payne<sup>43</sup><sub>May</sub> gives an illustration of the fact that a quantity of the drug which is well borne on one occasion may evoke the most dangerous symptoms on another. Sykes<sup>43</sup><sub>May</sub> reports an instance in the practice of another physician in which death followed the administration of 2 doses of 10 grains (0.65 gram.) each, given with a short interval to a girl of ten years of age. Another patient became comatose after a few 10-grain (0.65 gram.) doses. Ory<sup>24</sup><sub>Mar. 18</sub> has seen a general miliary eruption produced by antipyrin. C. C. Claremont<sup>2</sup><sub>Oct. 27</sub> describes 2 cases of a papulo-erythematous rash following its use. Drasche<sup>8</sup><sub>Oct. 11</sub> gives an elaborate review of the bad results which are reported as sequelæ to its administration, and contributes instances from his own experience. He calls attention to the profuse sweats which so often occur, and to the rigors, which he has found sometimes quite severe. He details one case of extreme collapse caused by this drug, and another of copious hæmorrhagic exanthema with extreme depression from which the patient did not recover. In 2 cases of migraine violent sneezing

was always produced by it. In one case there was redness and swelling of both lower eyelids and pain in the throat. He has repeatedly seen vesical spasm follow, and in two instances retention of urine for 24 hours. A careful study of the relation of the urine to antipyrin showed it to be always diminished in amount during treatment with the drug. Bard<sup>211</sup> considers antipyrin dangerous in relapses in typhoid fever, on the ground that it produces a liquefaction of the blood and interferences with a nutrition already much impaired. T. J. Bokenham<sup>15</sup> saw an urticarial rash produced in two instances, giddiness, difficult breathing, drowsiness and delirium in another, and giddiness with coldness of the extremities in a third. Forsbrook<sup>6</sup> has known it to occasion a species of intoxication when given to a young woman suffering from migraine. Cihak<sup>283</sup> saw an erythema develop after the local employment of antipyrin for uterine cancer, and in 2 instances after hypodermic injections. In another patient 1 gram. (15 grains) produced sneezing, dyspnœa, a feeling of anxiety, swelling of the lids and palate, and injection of the conjunctiva. H. Wossidlo<sup>4</sup> has not been encouraged by his experience with the hypodermic employment of antipyrin, though having used it in but 5 cases. In 2 patients with asthma, the medicine, given during an attack, seemed only to increase its intensity. In all cases the injection produced a burning pain lasting some days, and in one patient twice produced abscess. Other writers, also, have complained of the pain produced by the hypodermic use of the drug. J. Hess<sup>4</sup> has found the injections painful in almost all instances, and productive of inflammation, though abscess did not result. In one case the pain was so intense that the patient fainted. As he has also seen unpleasant general symptoms appear in several instances, he is opposed to this method of exhibiting it. A. Wolff<sup>116</sup> refers to the pain which the injections often produce, though he has seldom found patients refuse to have the operation repeated. Balzer and Klumpke<sup>24</sup> say that the injections are nearly always painful and liable to produce ecchymoses. H. Müller<sup>214</sup> has seen abscesses caused by them. The same writer refers to the peculiar "paradoxical" action of antipyrin, in which the temperature rises instead of falling after an antipyretic dose. He has collected from the literature 3 instances of this, to which he adds a very interesting observation of his own. The patient, a girl

of 10 years with acute articular rheumatism, suffered from a marked rise in temperature every time that 0.75 gram. (12 grains) of antipyrin was administered. With this there were the most alarming general symptoms of antipyrin poisoning. There was, however, no eruption seen. Another example is a case reported by L. Roulin,<sup>24</sup> in which a rise of temperature followed the administration of antipyrin given to relieve neuralgia. The urine at the same time contained casts, and the author believes that the fever was due to the absorption from it of urea or leucomaines. There are a few dissenting voices regarding the danger from antipyrin. B. Marshall,<sup>7</sup> considers that most of the instances in which serious consequences have followed the administration of antipyrin are not properly to be attributed to it at all, and Magie<sup>82</sup> expresses the same view. Sée,<sup>22</sup> has never seen the rash unless the drug had been administered in large doses and during some time. Under these circumstances he has observed it about once in 12 to 15 cases in women, and once in 50 to 60 cases in men. A perusal of the cases to which I have already referred will show that the views of this author are not always borne out by the facts. As an example of the tolerance sometimes shown toward antipyrin, Bovet<sup>24</sup> reports the case of a patient with facial neuralgia to whom during 2 months of treatment 284 gram. (39) of the drug were given by the mouth and 30 gram. (3 7½) hypodermically.

*Arsenic.*—Moloney<sup>139</sup> recommends the application of liquor arsenicalis, B.P., in the treatment of diphtheria. The membrane is first to be removed by tearing it off, or by revolving a stiff bristle brush pressed against the tonsil, and the solution is then to be applied on cotton-wool every 3 to 4 hours. B. G. Pullin<sup>131</sup> has great confidence in the value of the internal administration of the liquor arsenicalis in the treatment of warts. He reports a number of cases in which great success followed its use, and without any external application whatever. J. Sawyer<sup>32</sup> says that experience has confirmed his belief in the value of arsenic as a specific in chorea. The medicine should be rapidly pushed, increasing the amount by 3 minims (0.19 gram.) per dose, t.d., every 5 days, until a child of 10 years is taking 35 minims (2.32 gram.), t.d., or until vomiting is produced. In chronic cases arsenic in large doses rarely fails to cure when the drug in small amounts has proved useless. It is also serviceable in the grave chorea of preg-

nant women. Sawyer<sup>191</sup> further praises arsenic as one of the best agents with which he is acquainted for the cure of simple gastralgia. With a pill of  $\frac{1}{2}$  of a grain (0.0027 gram.) of arsenious acid and 2 grains (0.13 gram.) of extract of gentian, t.d., recovery is steadily attained in ordinary cases. In those of a severer form counter-irritation to the epigastrium is also to be recommended. The diet should be generous, as a dyspeptic regimen makes a case of gastralgia worse, provided we are assured that there is no gastric catarrh present. (For arseniate of gold, see "Aurum.")

*Aurum (Gold).*—Addison,<sup>2</sup> has combined gold and arsenic under the name of the dynamic arseniate of gold. It is claimed that the compound will be especially useful in cutaneous affections, secondary and tertiary syphilis, different forms of cachexia, nervous diseases, etc. It is employed in progressive doses in 1 to 30 milligram. ( $\frac{1}{1000}$  to  $\frac{1}{2}$  grain).

*Balsam Peruvianæ.*—S. Rosenberg<sup>57</sup> claims that none of the usually recommended mouth-washes are satisfactory, and therefore advises the use of Peru balsam for this purpose. He claims that in alterations of tissue in the lining of the mouth it stills the pain, hastens healing if there is ulceration, and removes epithelial thickenings. It should be applied gently or firmly with a brush 1 to 3 times a day, and the medicament held in the mouth for 3 to 5 minutes, in spite of the increased flow of saliva which it produces. The treatment must often be continued for some time.

*Barium.*—Kobert,<sup>6</sup> has recently tried barium chloride in the form of an ointment in dilated cutaneous veins, but without benefit.

*Bay.*—The oil of bay (*huile de laurier*)<sup>107</sup> is said to be extensively used in Switzerland to keep butchers' shops free from flies, and that after a coat of it has been applied to the walls the insects will not remain in the house. It has also been found effectual in the South of France in preserving gilt frames and chandeliers from becoming soiled.

*Bela.*—The pulpy part of the fruit when ripe acts as a slight laxative, and is useful in cases of habitual constipation. The unripe fruit is regarded in India as an astringent, and is recommended as a valuable remedy in chronic diarrhœa and dysentery. The bela mixture—2 parts of the pulp, 4 of water, and 2 of sugar—is said not only to act well in diarrhœa, but has the singular property

of being aperient as well. If this disagrees with the stomach, the extract may be used instead. The dose of this latter is 2 to 4 gram. ( $3\frac{1}{2}$  to  $3\frac{1}{2}$ ) 2 to 3 times a day. It is more active than the fresh pulp. <sup>296 61</sup><sub>Nov. 9; July 7</sub>

*Belladonna*.—F. Cary <sup>115</sup><sub>Jan. 1884</sub> reports the symptoms of poisoning occurring in a woman who had taken a large toxic dose of atropia, and the means which were resorted to in treating her. Tetanic convulsions finally developed, and it was necessary to use the battery for some time, but the patient finally recovered. Hausmann, <sup>116 64</sup><sub>Jan. 1884</sub> after discussing the way in which drugs control hæmorrhage, advises the use of atropia for hæmoptysis, and reports a case where ergot and the terebinthines given during 8 days had failed, but where hypodermic injections of  $\frac{1}{200}$  to  $\frac{1}{100}$  of a grain (0.00032 to 0.00054 gram.) repeated a few times checked the bleeding. J. F. Brown, <sup>9</sup><sub>Feb. 11</sub> recommends suppositories of oleate of atropia in place of those of belladonna. Ten grains (0.65 gram.) of atropia dissolved in  $\frac{1}{2}$  ounce of oleic acid and diluted with oil to 1 fluid-ounce and 20 minims (32 gram.) will form a solution of which each minim represents 1 grain of the extract of belladonna. J. Abeille, <sup>55</sup><sub>Jan. 1884</sub> reports 10 cases illustrative of almost instantaneous relief of pain in sprains treated locally by the extract of belladonna. He covers the affected part with a strong ointment of the extract of the drug, and envelops it in cotton wet in cold water. These applications should be changed every few hours. The relief of the pain is so marked that the patients are usually able to walk within 24 hours. Wicherkiewicz, <sup>1</sup><sub>May 10</sub> relates a case in which the injection of  $\frac{1}{50}$  of a grain (0.0013 gram.) of atropia proved antidotal to the poisoning resulting from an overdose of pilocarpine; morphia and nitrite of amyl having proved useless.

*Benzoin—Benzoic Acid—Benzootes*.—Genser, <sup>3</sup><sub>Apr. 18</sub> has tried insufflations of powdered resin of benzoin in 36 children with whooping-cough, but without good effect. The average duration of the disease was 48 days, the treatment was inconvenient, caused coughing, and was not well borne by the patients. The *benzote of soda* has been used by Partzevsky <sup>26</sup><sub>Mar.</sub> in 10 cases of uræmia, 1 to 2 drachms (4 to 8 gram.) being given during the day in divided doses every hour. Nine patients recovered. He believes that the drug shortens the attack, the patient falling into a deep sleep and awaking conscious. L. C. Boislinière <sup>65</sup><sub>Mar.</sub> gave 4 to 15 grains

(0.26 to 1 gram.) of benzoate of soda every one to two hours to upward of 100 cases of acute follicular tonsillitis, and is of the opinion that duration of the disease is shortened thereby to 12 to 36 hours, instead of lasting 2 to 5 days, as is usually the case. In some instances the white, cheesy points disappeared in 8 to 10 hours. The drug may be given with impunity even to children, and undoubtedly controls the febrile elements in the disease. Heckel<sup>80</sup> commends the sulphibenzoate of sodium, dissolved in water in the strength of 4 to 5 gram. (60 to 75 grains) to the litre, as an application to wounds. It is superior to carbolic acid, while it equals the salts of mercury without their toxicity, and iodoform without its disagreeable odor.

*Benzol.*—Macalister<sup>187</sup> tried benzol in children with whooping-cough, most of them having had the disease 2 to 3 weeks when the treatment was commenced. The improvement was so marked in many cases that the author could not but attribute it to the influence of the drug. It, nevertheless, proved of no benefit in the first 14 days of the whooping stage, but only in the third week and the period of decline, when it lessened the number of paroxysms, and seemed to hasten the recovery. The dose is 2 to 6 minims (0.13 to 0.39 gram.) or more. As it is insoluble in water, it may be conveniently given in the formula: benzole, 2 minims (0.13 gram.); sp. vin. rect., tr. chloroform co., āā 2½ minims (0.16 gram.); syr. simpl., 20 minims (1.3 gram.); mucilag., ad 1 drachm (4 gram.). J. Lowe<sup>9</sup> highly recommends it in whooping-cough in doses of 2 to 4 minims (0.13 to 0.26) every 2 hours. To disguise its hot, burning taste, he gives it in a viscid mixture with glycerine and oil of peppermint and some syrup.

*Bismuth.*—The salicylate of bismuth is recommended by W. H. L. Hale<sup>144</sup> in diseases of the alimentary canal. In severe diarrhœa in children he never commences with a dose of less than 5 to 8 grains (0.32 to 0.52 gram.). With this drug it is possible to dispense entirely with opium in many instances. Its beneficial action is undoubtedly due as much to the antiseptic power of the salicylic acid as to the astringent property of the bismuth. Their combination certainly gives us a valuable remedy in inflammatory disorders of the stomach and intestine. Many cases of vomiting, even in pregnant women, will yield to it. J. Ehring<sup>6</sup> has found this salt free from excess of salicylic acid, very useful in

the intestinal affections of children, it has both an astringent and disinfectant action, is without disagreeable after-effects, is pleasant to take, and can be given continuously for long periods. It can best be administered to children in a mixture with glycerine and water, to be shaken before taken. The form of powder should be avoided, as liable to produce irritation of the gastro-intestinal mucous membrane. Solger,<sup>6</sup> reports it serviceable in chronic diarrhoea in children, where many other remedies had failed. It is given in 8 to 10 grain ( $\frac{1}{15}$  to  $\frac{1}{10}$  gram.) doses three times a day at the age of 3 years. The author seems to have no fear of the powder form. The efficacy of the drug appears to depend on its disinfecting power. The subnitrate of bismuth is referred to by G. Galli<sup>540</sup> as a neglected remedy for external use. He has found it very useful in acute and chronic moist eczemas, as well as in intertrigo and excoriations in the region of the anus and genitalia in children. In fissured nipples, herpes zoster, ulcers, and in affections of the mucous membranes it has also proved serviceable.

*Boldo*.—Juranville<sup>80</sup> sums up the results of the experiments of French physicians with the glucoside boldin, contained in boldo-leaves. He considers it superior to any other hypnotic or narcotic, while it is very easily taken, produces no disagreeable symptoms, and even increases the appetite and strengthens the patient. The sleep produced is natural in every respect, and the respiration is regular and quiet. The action of the drug was excellent in excited hysterical and nervous patients troubled by great insomnia. Doses of 5 to 10 gram. (grains 75 to 3 2½) have been given daily without causing any bad results. The amount of the glucoside contained in the leaves is about 3 per cent. The hypnotic action of the drug was first observed by Laborde four years ago.

*Boric Acid*.—Gaucher<sup>140</sup> judges from his experiments with boric acid on the rabbit that it would require about 75 gram. (3 2½) per day administered for several days to produce in man any dangerous symptoms. He has obtained rapid recovery with it in contagious impetigo and in eczema, using an application of 3 parts in 30 of glycerole of starch. It has the effect of oil of cade, without its disadvantages. He administered 0.5 to 1 gram. (7½ to 15 grains) per day to a number of patients with pulmonary tuberculosis, and believes that both the local and general symptoms were improved, while the sputum lost its fetidity. It had, however, no action on

the bacilli. He also substituted the internal use of the acid for the local employment of it in cystitis, and with the result of removing the pus from the urine. Sevestre, Comby, and Cadet de Gassicourt,<sup>3</sup><sub>Feb. 15</sub> agreed entirely with Gaucher as to the value of boric acid in impetigo and eczema, but Terrier<sup>3</sup><sub>Feb. 15</sub>; <sup>22</sup><sub>Feb. 19</sub> doubts its efficiency in these diseases, and prefers, also, borate of soda for the internal treatment of cystitis. Cabanis,<sup>140</sup><sub>Feb. 24</sub> refers to a method, not original with him, of rendering boric acid more soluble. This consists in mixing 120 parts of boric acid with 10 of calcined magnesia and 750 of water. It is possible that a biborate of magnesia is formed in this way, but at any rate a considerable portion of the acid is in solution in excess. Seely<sup>82</sup><sub>Mar. 10</sub> concludes that in suppuration of the middle ear the packing of the meatus with pure, impalpably powdered boracic acid is to be preferred to insufflation with the same; that this method of using it is safe if the ears be inflated daily. A large majority of cases will get well by keeping the ear dry in this manner. Lebowicz,<sup>108</sup><sub>Aug. 1</sub> after trying boric acid in a number of cases of phthisis, diarrhœa, pneumonia, etc., concludes that the drug, used internally and externally, has many advantages in the treatment of the diseased organism, as it is cheap, well borne, harmless, and antiseptic. G. T. Welch,<sup>59</sup><sub>Nov. 2</sub> on the other hand, reports two cases in which the application of tampons of powdered boracic acid produced symptoms of general poisoning. In one case the skin had a dried, "charred" appearance, and in the other there was collapse. In both cases there was very marked coolness of the vagina. Bedoin,<sup>61</sup><sub>Sept. 15</sub> recommends the internal administration of boracic acid in place of carbolic acid.

*Bromides.*—Cory<sup>2</sup><sub>May 20</sub> writes in favor of the sodium bromide in preference to the potassium salt. It is not only a more healthful and less depressing preparation, but it is richer than the latter in bromine, in the proportion of 10 to 8.6.

*Cactus Grandiflora.*—E. C. Morton<sup>192</sup><sub>Sept.</sub> has used the fluid extract of cactus grandiflora as a cardiac tonic, and reports several cases in which he obtained good results with it. In some instances it appeared to be efficacious when digitalis had failed.

*Cæsium.*—(See *Rubidium*.)

*Caffein.*—Huchard<sup>109</sup><sub>Feb.</sub> recommends caffein as a true cardiac tonic; a powerful diuretic in the later stages of heart-disease. It is best given in liquid form, and for this purpose he suggests



the following formulæ: 1. Benzoate of sodium, caffein, āā 1 part; distilled water, 30 parts. The dose of this is 2 to 6 tablespoonfuls during the day. 2. Benzoate of sodium, caffein, āā 35 parts; raspberry syrup, 2500 parts. Dose as above. 3. For hypodermic administration, for which it is excellently fitted, he advises: sodium benzoate, 3 parts; caffein, 2.5 parts; hot, distilled water, 6 parts. One to four syringefuls daily. 4. If it is desired to avoid the benzoate for any reason the salicylate may be substituted, as sodium salicylate, 3 parts; caffein, 4 parts; hot, distilled water, 6 parts. Dose as above. These preparations are most valuable, not only in heart diseases, but in affections of the kidney, especially where digitalis is contra-indicated. Subcutaneously, caffein is a general stimulant and tonic; valuable, consequently, in all adynamic affections and in infectious diseases complicated by or complicating disorders of the heart. 5. Finally, the author recommends the following wine of caffein: sodium benzoate, caffein, āā 5 parts; Malaga wine, 500 parts. Dose, half a wineglassful occasionally. In a later communication<sup>3</sup> he describes a very threatening case of cardiac disease in which, after digitalis had entirely failed to give relief, caffein both strengthened the force of the heart and produced diuresis. He considers it valuable in adynamic diseases of the lungs, as in pneumonia of old age, where danger exists from the possible failure of the heart. He quotes from a letter from Semmola stating that he had found caffein of great value in certain cardiopathies of bulbar origin. It was particularly efficacious in cardiac arrhythmia and adynamia of this nature. Te Gempt<sup>4</sup> has employed the sodio-salicylate of caffein in 40 cases of diseases of the lungs. He discusses the subject fully and reports several cases in detail, concluding that the remedy is indicated in acute fibrinous pneumonia whenever there are signs of cardiac failure, and that its administration should be commenced, if possible, before collapse develops. In infants, old persons, drunkards, and where there are valvular lesions it should be exhibited from the first. It diminishes the frequency of respiration and pulse, increases the arterial pressure, lessens the temperature, and improves the subjective sensations of the patient. In threatening cases a more rapid effect may be obtained by giving it hypodermically, though it acts speedily by the mouth. Caffein is also valuable in atelectasis, hypostatic congestion of the lungs,

and in emphysema. Moncorvo<sup>35</sup><sub>Nov. 22</sub> reports his experience with the hypodermic injection of the benzoate of caffein in children, a procedure to be adopted in combating all conditions accompanied by adynamia, where the case is urgent and the stomach irritable. He details some cases illustrating the power of the drug. The dose employed was 0.15 to 0.30 gram. (2 to 5 grains). Gram (Report of Levison, corresponding editor, Copenhagen) says that caffein in doses of  $\frac{1}{2}$  gram. possesses a diuretic action, but that as it sometimes causes mental excitement it may be necessary to give paraldehyde at the same time. Theobromine, on the other hand, has the same diuretic power in doses of 1 gram. (15 grains) without the exciting action.

*Calcium.*—The phosphate of lime has been used by Kölscher<sup>366</sup><sub>Ed. 27, H. 4; 51 Sept.</sub> in the effort in this way to favor calcification of tuberculous products. He used the acid phosphate with an excess of phosphoric acid. Fungous accumulations which had not ulcerated were treated by injections, and in many cases did very well. Cold abscesses, tuberculous fistulæ, and fungous ulcerations were successfully treated with tampons of gauze wet with the solution. The injections were made into tuberculous joints and even into bone itself. They were painful and were often followed by severe reaction, lasting several days. Schnitzler<sup>61</sup><sub>Jan. 28</sub> recommends the insufflation of the powdered phosphate of lime in laryngeal phthisis, the mucous membranes being first cleansed by inhalations of chloride of potassium, chloride of sodium, salicylic acid, or boracic acid. The whole mucous membrane is then to be completely covered with the powder. Though the substance has no specific action on the tubercular process, relief and even recovery was obtained in several cases. E. Harnack<sup>4</sup><sub>Apr. 30</sub> believes that too little value is attributed to lime-water. It does not dissolve the particles of coagulated fibrin of diphtheritic membranes, but acts on the mucin which binds them together and exerts also an astringent power upon the mucous membrane. It is therefore an indispensable substance in the treatment of diphtheria and one which cannot be supplanted by any other of our present *materia medica*. It should not, however, be applied by the spray, as in this way it rapidly becomes changed to the carbonate of lime, but should be used as a gargle or in some other way. In ordinary pharyngeal catarrh lime-water is of service, as it is the only substance which acts as

an astringent to the mucous membrane and at the same time dissolves the mucus.

*Camphor*.—L. E. Maire<sup>234</sup> reports a case illustrative of the power of camphor to control the secretion of saliva. The patient had had an injury of the face, severing Steno's duct and producing a salivary fistula. In a few days the discharge of saliva stopped, but the cheek became enormously swollen from pressure of the inflamed wound on the duct. Under the influence of an ointment of camphor the secretion of saliva was checked, the swelling disappeared, the inflammation around the wound grew less, and in a few days complete recovery was accomplished, with closure of the fistula. Three years ago Th. Schaefer<sup>80</sup> reported the results of his trials of a mixture of carbolic acid and camphor, which he called "phenol camphor;" and now M. B. Cochran<sup>80</sup> describes the same substance under the name of "carbolate of camphor." It is made by dissolving camphor in a 95 per cent. solution of carbolic acid to saturation. The acid will take up about three times its weight of the gum, and the result is a thin, clear, oily liquid, with a strong odor of camphor and a very faint odor of carbolic acid. It is a powerful local anæsthetic when applied to an abraded surface, or when a few drops are injected under the skin. Applied on cotton to a wound it prevents suppuration. It will abort boils if it be mixed with an equal quantity of sulphuric ether and injected into them. The author reports a case of herpes of the leg, in which one thorough application of the preparation entirely relieved the burning, itching, and pain. Gaucher<sup>80</sup> has had excellent results in two cases of diphtheria by removing the false membranes and painting the tonsils with a concentrated mixture of carbolic acid and camphor in oil, the preparation being very much like the carbolate of camphor described. Th. Schneider<sup>2</sup> considers the camphorated carbolic acid a reliable and very convenient antiseptic preparation. It has neither the smell nor the caustic properties of the acid, while the antiseptic powers remain intact. The monobromate of camphor has been recommended by C. Black<sup>19</sup> for the treatment of epilepsy. He combines it in the following formula: Monobromate of camphor, 37½ grains (2.4 gram.); ext. belladonna, 6 grains (0.39 gram.); ext. gentian, q. s. Divide into 12 pills, one of which is to be taken 2 to 3 times a day.

*Camphoric Acid*.—M. Niesel<sup>89</sup> thinks that camphoric acid may very possibly prove to be of value in the night-sweats of phthisis where given in doses of 1 to 2 gram. ( $7\frac{1}{2}$  grains) at night. In a  $\frac{1}{2}$  per cent. to 1 per cent. solution with a small quantity of an alkali, he found it a useful application in catarrh of the larynx and nares, and as an inhalation in bronchitis. He also obtained excellent results in chronic cystitis. Reichert,<sup>41</sup> has for a year and a half been using camphoric acid locally for acute and chronic affections of the mucous membrane of the nose, larynx, mouth, and bronchi, and in acute diseases of the skin. A  $\frac{1}{2}$  per cent. to 1 per cent. solution is valuable in acute angina and in subacute pharyngo-laryngitis and tracheitis. It may be applied either directly or by spray or inhalation. Diphtheria did not appear to be influenced by it. A 2 per cent. solution applied on cotton, or one of 1 in 500 used as a douche was serviceable in acute coryza. It is especially valuable in bronchiectasis and in chronic bronchitis and pneumonia, by aiding expectoration and through its disinfecting properties. Tuberculous ulcers of the larynx heal in 6 to 10 weeks under applications of a 2 per cent. to 6 per cent. solution. Fürbringer's results,<sup>41</sup> were by no means so favorable as those of Reichert. He has tried it in 30 to 35 cases of cystitis, and with some action in 50 per cent. of these, especially when solutions of the drug were used for injection. Yet the influence was not so much on the catarrh producing the pus as on the decomposition taking place in the urine. He has no faith in the acid in angina nor tubercular processes, except that in 50 per cent. of all the cases of phthisis in which he administered it internally it had a decided influence in allaying night-sweats.

*Canadol*.—Pliouchkine<sup>108</sup> recommends canadol, a derivative of American naphtha, as a local anæsthetic. It is a transparent, volatile liquid, smelling of benzine, and insoluble in alcohol and water. It causes a sensation of cold in the first minute, within which time the anæsthesia is complete. It will entirely subdue the pain of minor surgical operations.

*Cannabis Indica*.—From his experience in India, J. F. P. McConnell<sup>15</sup> praises cannabis indica for the anorexia following exhaustive diseases, a condition very frequently seen in India. When there is a repugnance to and an intolerance of food in almost every form, which is not relieved by acids, nux vomica, and

bitters, he has found that 5 to 10 minims (0.32 to 0.65 gram.) of the tincture, or  $\frac{1}{4}$  to  $\frac{1}{2}$  grain (0.016 to 0.032 gram.) of the extract, given t. d. half an hour before meals, often brings back the appetite in 2 to 3 days. Attention was called to this property of the drug 50 years ago, and it is, moreover, a well-known fact that "ganjah-smokers" and "shidee-drinkers" have voracious appetites. In dyspeptic diarrhœa and in the first months of the true tropical diarrhœa it is often of great service. On the ground that tropical diarrhœa is primarily and essentially a disease of the liver, he says that mercury should be administered to directly medicate this organ, while the cannabis indica acts by diminishing the irritability and excessive peristalsis of the intestines. The dose should be gradually increased to 10 to 20 minims (0.65 to 1.3 gram.), t. d., or oftener. It has the advantage over opium in this affection that it in no way interferes with the bile-producing action of the liver. In the very advanced stages of the disease there are organic changes in the liver, and cannabis is as useless as are all other drugs. Its constipating effect upon the habitués of the drug is well known in India. As a hypnotic it is very useful combined with small doses of chloral and bromide of potash. Check experiments have convinced him that the effect is not due to the latter drugs solely. J. Prior<sup>34</sup><sub>Aug. 14</sub> has tried 100 separate administrations of a cannabinum tannicum on 35 persons. A complete narcotic action was seen after 42 doses, incomplete after 17, and none at all after 41. The dose was 0.5 to 1.25 gram. ( $7\frac{3}{4}$  to 18 grains). In some cases a delirious condition was produced. Cannabinon was used in 26 cases, and balsamum cannabis indicæ 80 times in 10 cases. He concludes that the first preparation is the best of the three, but that none of them are to be compared as hypnotics to morphia, chloral, and sulphonal. The last two preparations of cannabis are especially to be condemned, as they must be used with the greatest caution when the heart is affected. He would, indeed, recommend that they be not used at all.

*Capsella Bursa Pastoris*.—V. Ehrenwall<sup>22</sup><sub>June 20</sub> has for 4 years been experimenting with the hæmostatic power of this plant, whose virtues for this purpose have long been known among the peasantry of some parts of Germany. He has repeatedly used it in all forms of hæmorrhage, and with such success that he considers it the most reliable of all our hæmostatics. The infusion of the fresh

plant is the best, or a fluid extract may be used in doses of one teaspoonful three times a day. The dried plant is inert. A second dose repeated too soon causes difficulty of breathing, headache, and vomiting. The efficacy of the plant is said to depend on the "bursuric acid" which it contains. A similarly favorable estimation of the plant is held by E. Bombelon,<sup>80</sup> who recommends the fluid extract in doses of 3 1 to 2 (3.9 to 7.8 gram.) to check hæmorrhage or as a substitute for ergot.

*Carbolic Acid.*—Verneuil<sup>12</sup> recommends the application of a 2 per cent. alcoholic solution of carbolic acid as a means of aborting boils and carbuncles. The healthy skin should be thoroughly protected from the solution, which should be employed in the form of a spray, directed from an ordinary steam atomizer against the part for two hours at a time. Pain is very quickly stopped, and 3 to 4 séances suffice for a cure. In the intervals between the application the carbuncle is covered with a compress of thin muslin saturated with a carbolic acid solution, and this is protected by an impermeable covering. Th. Weiss<sup>184</sup> reports several cases in which he has used the continuous carbolic acid spray with great success as an antiseptic application in surgical cases. Roulin<sup>6</sup> has successfully treated 22 cases of diphtheria with carbolic acid. Nasal douches, consisting of 3 teaspoonfuls of the crude acid to 1 litre (2 pints) of water were employed hourly. Solles<sup>6</sup> gives minute doses of carbolic acid with larger doses of chloral to children suffering from whooping-cough. If the child is on the breast, the mother may take 5 grains (0.32 gram.) of carbolic acid daily: Newton<sup>59</sup> reports a case of poisoning from the ingestion of a tablespoonful of 95 per cent. carbolic acid, treated successfully by sulphate of magnesia, freely and repeatedly given.

*Carbolute of Camphor.*—(See *Camphor*.)

*Carbon.*—(See *Sulphur*.)

*Cascara Sagrada (Rhamnus Purshiana).*—R. O. Cotter<sup>207</sup> reports two interesting cases in which the fluid extract of cascara sagrada in ordinary doses produced very exhausting purging, with great prostration and feebleness, lasting several days. C. M. Fenn<sup>80</sup> reports several cases showing that griping, pain, vomiting, bloody evacuations, and abdominal tenderness are capable of being produced by the drug. One case of acute insanity he believes to have been of a reflex nature, arising from the gastric and intestinal

irritation caused by the continued use of the drug. In another case dying of cerebral anæmia there were a number of ecchymotic patches in the stomach, which the author believes must have been caused by an excessive use of cascara. G. E. J. Greene<sup>15</sup> reports 3 cases in which the ordinary fluid extract produced vomiting and griping, but in which the new tasteless preparations were well borne and effectual. These tasteless fluid extracts are now put on the market by several firms, and it is probable that some of them, at least, depend for the absence of disagreeable symptoms on the removal of the ferment discovered by H. F. Meier and J. L. Weber.<sup>287</sup> J. Anderson<sup>202</sup> writes of a whimsical patient who was unwilling to take medicine of any kind, and to whom he secretly administered cascara in port wine and corrected the constipation. A. L. Perry<sup>202</sup> says that it is important to remember that the drug is not a cathartic but a mild tonic laxative. It is therefore to be given in small, frequently repeated doses for a considerable time. One of the most remarkable features of cascara sagrada developed during the year is its seeming value in rheumatic affections, which was accidentally discovered by H. T. Goodwin<sup>1</sup> in his own case. He then tried the drug in a number of patients who had been taking various other anti-rheumatic remedies, and within 24 hours there was a very marked improvement in all of them. He has since used it in 30 cases with most satisfactory results, except in 3 or 4 in which there was a syphilitic taint. He reports several of these which show that the drug possesses an undoubted and really remarkable power, even in rebellious cases. The dose employed was 15 to 20 drops t. d. When diarrhœa is produced it is well to administer iron also, but separately. J. P. Martin<sup>6</sup> suggests the mixture of the fluid extract of cascara sagrada with salicylate of soda for the treatment of rheumatism. He would give 10 drops of the former and 15 grains (1 gram.) of the latter in orange-flower water every 3 to 4 hours. I have administered cascara sagrada in several cases of acute and chronic rheumatism. Although the results have not been as yet very encouraging, I by no means feel disposed to condemn its further trial.

*Castor-Oil.*—(See *Ricinus*.)

*Cerium Oxalate.*—W. H. Gardner<sup>59</sup> praises very highly the oxalate of cerium in sea-sickness. He has used it in doses of 10

to 25 grains (0.65 to 1.6 gram.) every 2 to 3 hours, and believes it superior to any other means he has ever tried. He has also found it serviceable in hundreds of cases of sick-headache and in the morning sickness of pregnancy, but it must be in doses at least of 10 grains (0.65 gram.) to do any good. M. C. Waldron,<sup>59</sup> confirms this statement regarding the drug in sea-sickness, having given it in doses of 15 gram. ( $3\frac{1}{2}$ ) every 2 hours in a number of cases. He believes it will relieve more patients than any other remedy yet suggested.

*Chinolin*.—Domat,<sup>24</sup><sub>June 10</sub><sup>80</sup> says that chinolin possesses antiseptic powers, even when dissolved in water, in which it is very slightly soluble. A mixture of 1 part in 500 parts of mint water with 50 parts of alcohol is to be recommended as a gargle in diphtheria, and the author has used it in this disease with considerable success. The salicylate and the tartrate of chinolin are more soluble, and are to be preferred in surgical practice. A 1 in 150 solution of the tartrate is a useful injection in gonorrhœa.

*Chloral*.—Saint Marc,<sup>154</sup><sub>June</sub><sup>147</sup><sub>Sept.</sub> believes that chloral has a direct and special influence on the contractility of the stomach. He has witnessed great benefit from its use in the vomiting of pregnancy and in that of gastric vertigo, given in doses of 15 grains (1 gram.) immediately after food. Aufrecht,<sup>118</sup> advises chloral in preference to morphia in cerebral pneumonia, delirium tremens, and puerperal eclampsia. He recommends it also in singultus, insomnia of elderly people, and all maniacal conditions. In melancholic conditions, on the other hand, morphia is to be preferred. A. J. Howe,<sup>192</sup><sub>May</sub> quotes from numerous medical correspondents to support his own view that chloral is by no means so dangerous a drug as it is often stated to be. Joffroy,<sup>60</sup><sub>Mar. 24</sub> considers chloral a very powerful antiparasitic, and employs it for the topical treatment of diphtheria. He washes the throat with a 2 per cent. solution, and then applies a 20 per cent. solution to the false membranes, which soon disappear. The throat remains ulcerated and the applications are continued, but the disease is transformed into erythematous angina. The treatment cannot be applied to children. The antiseptic properties of chloral have also been utilized by Mercier,<sup>108</sup><sub>Feb. 15</sub> in the treatment of this disease. He administers the drug every half hour, and in sufficient quantity to render the patient somnolent; water should always be drunk before the medicine is taken, in



order to prevent any irritation of the stomach, but none should be allowed after it, that the drug may remain in contact with the mucous membrane of the throat. After 24 hours of treatment the condition of the throat will be found to be unchanged, but in 48 hours the false membrane will have disappeared. When this change is commencing the swallowing of the chloral becomes painful. In some cases the separation of the false membrane does not occur until the third day. If the disease has attacked the larynx, and the voice is completely gone, the use of chloral is rather injurious than beneficial.

*Cinchona*.—Regarding the cinchona-tree itself, H. H. Rusby<sup>161</sup> says that the natives make a peculiar use of the large terminal buds, crushing them into a gelatinous mass, and applying them to fresh wounds, where, probably, through an antiseptic action, they exert a very favorable influence. Quinine, in the opinion of J. W. Mulvey<sup>190</sup> is a valuable remedy in restoring nerve-force. He refers to the nerve-sustaining power which it exhibits in many patients, when a single dose is taken in the morning. J. Weaver<sup>22</sup> considers quinine a remarkably effective remedy in insomnia arising from debility or nervous irritability, a dose at bed-time usually producing sleep of several hours' duration. Where, however, the sleeplessness is due to a congested condition of the brain and its blood-vessels, the drug only intensifies the condition, and produces headache. A. U. Evarts<sup>121</sup> has known sleep to be produced by large doses of quinine uncombined with other drugs. He has proved its oxytoxic action repeatedly. In weak and ineffectual pains he considers 4 to 7 grains (0.26 to 0.45 gram.) of quinine superior to all other medication. In amenorrhœa from uterine inertia he prefers it to other drugs, and never saw a case of follicular pharyngitis which would not yield to it. He claims, too, that it will certainly give good results in gonorrhœa. C. Liégeois<sup>35</sup> has frequently seen the value of quinine in preventing an attack of spasmodic laryngitis, and has further employed it in palpitation of the heart, using the sulphate, muriate, or valerianate when there was a coincident increase of arterial tension, and the hydrobromate when the tension was lowered. In migraine with pallor he gives the sulphate, and in congestive migraine the hydrobromate. Where no vascular modifications accompany the migraine, either salt of quinine may be used. He has previously reported cases of sym-

metrical asphyxia of the lower extremities cured by full doses of sulphate of quinine, and has likewise seen it benefit neuralgia with vasomotor symptoms. Quinine has astringent properties, and the author has observed chronic intestinal catarrh cured by its use. He believes, too, in its antisudorific action, and that it is a hæmostatic, the best of remedies for epistaxis, and of service in metrorrhagia and menorrhagia. He has used it in whooping-cough, and says that though he has not been able to convince himself that the disease was ever abridged by it, yet the severity of the symptoms was often greatly lessened. Further testimony as to its value in this disease is given by Binz,<sup>672</sup><sub>Jan. 5</sub>, <sup>24</sup><sub>Feb. 12</sub> who recommends, however, that it be given in large doses, equaling in number of decigram. ( $1\frac{1}{2}$  grains) daily the number of years the child is old, and Fervers<sup>386</sup><sub>v. 2, p. 12</sub> concludes, as the result of his experience, that the drug is a specific for whooping-cough, and that the reason in many cases of failure to act is to be sought in the fact that too small doses are given, that it is vomited, or that its administration is not persisted in. Its hypodermic administration is to be reserved for those cases in which it cannot be given in any other way, or for those in which the threatening nature of the symptoms renders a rapid action of the drug desirable. For hypodermic use he prefers the carbamide. De Beurmann and Villejean,<sup>67</sup><sub>Mar. 30</sub> however, after a long article on the hypodermic employment of quinine, conclude that the neutral hydrochlorate is the only salt which should be thus employed. It dissolves in two-thirds its weight of water at ordinary temperatures, and the solution keeps without alteration. The injection causes only slight pain, and produces no local or general trouble. In the absence of the neutral salt the solution may be formed by mixing the basic hydrochlorate with an equal part of pure hydrochloric acid. Chasseaud,<sup>67</sup><sub>May 18</sub> contributes an article to prove that he was the first to employ quinine hypodermically, having given it in this way in 1861. H. Corson<sup>19</sup><sub>May</sub> quotes from his extended experience with quinine during sixty years of practice. In treating malarial fever he has always deemed it important to begin the exhibition of the remedy as soon as possible after the abatement of the hot stage. He has usually found 10 grains (0.65 gram.) in divided doses sufficient to prevent a return of the chill, but in dangerous, pernicious cases 30 grains (2 gram.) should be given to render the matter sure. He condemns most

earnestly the indiscriminate administration of the drug and its use in too large doses; although in this connection it may be noted that J. M. Duncan,<sup>72</sup> reports a case which came to his knowledge where a man took 460 grains (30 gram.) of quinine in twelve hours. Several writers report adversely to the employment of quinine. T. B. Ross, for example,<sup>199</sup> in twenty years of practice has never seen any special indications for it in pneumonia, and believes that in this disease the drug is of no earthly use whatever. He also condemns it in septicæmia and typhoid fever. E. K. Weller<sup>186</sup> likewise considers quinine depressant, and would avoid it in the continued fevers, and I. N. Love,<sup>82</sup> believes it a dangerous medicine, to be given carefully. He would never use it as an antipyretic, but only as an antiperiodic. Jaccoud<sup>24, 80</sup> calls attention to the fact that delirium in typhoid fever may sometimes actually be produced or increased by its administration. R. M. King,<sup>82</sup> too, condemns its excessive employment in this disease, and, though using it at certain times, prefers salicylate of soda to reduce temperature; and J. F. Mentzer<sup>186</sup> has found that his cases of scarlet fever and typhoid fever do much better without quinine than with it, and has frequently found a marked improvement on the withdrawal of the drug. As illustrating the idiosyncrasies to quinine and unpleasant effects which may follow its employment, Ducrey<sup>2</sup> narrates the case of a man, aged 60, in whom doses of 0.5 gram. ( $7\frac{1}{2}$  grains) during 12 hours invariably produced a severe erythematous rash over the forehead, eyelids, and infraorbital regions, followed by slight desquamation. He has also known several instances of purpura hæmorrhagica caused by the internal use of the drug. Another instance of a cutaneous eruption is that reported by H. H. Vernon,<sup>2</sup> in which erythema, followed by free desquamation in large patches, was always a result of the administration of quinine. F. L. Jenkins,<sup>279</sup> too, relates a peculiar instance in which the ingestion of quinine was always followed by a red, shining, œdematous swelling of the prepuce, and an itching, papular eruption over the body. Rosenbusch,<sup>9</sup> narrates an instance where, after the ingestion of 15 grains (1 gram.) of the sulphate there developed shivering, tinnitus aurium, headache, coldness and pain in the extremities, palpitations, vomiting, and great prostration. An hour later the patient became unconscious, the temperature rose, the pulse grew rapid and compressible, the

pupils contracted, the tongue became dry, and respiration difficult. The skin of the whole body now presented a uniform redness, resembling that of scarlatina. The patient was delirious through the night, but on the next day was better, and the rash began to fade, while the tongue became red, and was coated with yellow patches. Sensations of tearing and of trembling in the limbs were complained of. In two days all symptoms had disappeared, and only a slight pigmentation of the skin remained. Tomaselli<sup>3</sup><sub>Oct.24</sub> says that in certain patients with malarial infection the administration of quinine, even in small doses, may do harm, the principal symptoms produced being fever and hæmaturia, the latter being due to the destructive action of the drug upon the blood. Giuffré<sup>3</sup><sub>Oct.24</sub> has seen two instances of hæmaturia in malarial patients developing immediately after the ingestion of quinine, but the experience of Carderelli,<sup>3</sup><sub>Oct.24</sub> Marchiava,<sup>3</sup><sub>Oct.24</sub> Fazio,<sup>3</sup><sub>Oct.24</sub> and Baccelli,<sup>3</sup><sub>Oct.24</sub> on the other hand, leads them to believe that this ictero-hæmaturic fever occurs entirely independently of its use. Baumgarten<sup>150</sup><sub>Apr.</sub> reports an instance of idiosyncrasy to quinine, the patient being attacked by violent dry cough on every occasion on which it was given; and Keyser<sup>62</sup><sub>Oct.15</sub> relates the case of a man who became totally and permanently blind a few hours after taking two doses, each containing a heaping teaspoonful of the drug. Cinchonidia is the only other alkaloid of cinchona-bark concerning whose employment anything of interest has come to our notice. G. T. Welch<sup>60</sup><sub>Nov.17</sub> has found that it causes much less unpleasant symptoms than quinine, though it is capable of producing very unpleasant effects. In his own person a dose of 15 grains (1 gram.) brought on an overpowering sense of weakness, with dyspnœa, and the drug caused similar symptoms in two other patients.

From authentic sources Boymond<sup>24</sup><sub>v.12, Apr.10</sub> has compiled a table which enables the reader to see at a glance the relative value of the different quinine salts. It shows how superior the muriate of quinine is to the ordinary sulphate in its proportion of alkaloid base and in solubility. The bisulphate is seen to be more soluble than the sulphate, but relatively poor in the amount of quinine base. A simple calculation shows that to obtain the therapeutic effect of twenty-four grains (1.6 gram.) of sulphate of quinine, thirty grains (2 gram.) of the bisulphate must be administered:—

SALTS OF QUININE.	Alkaloid Per Cent.	Solubility of One Part in Parts of Water at 50° F. (15° C.)	100,000 Parts of Water.		To give one grain of Quinine Anhydride, prescribe:
			Dissolve of Salt of Quinine.	Contain Quinine Anhydr.	
Hydrate . . . . .	85.72	1670.	0.00059	0.0005	1.16
Acetate . . . . .	84.37	Slightly.			1.18
Muriate, basic . . . . .	81.71	21.40	0.046	0.0388	1.22
Lactic, basic . . . . .	78.26	10.29	0.097	0.0759	1.27
Hydrobromate, basic . . . . .	76.60	45.02	0.022	0.0168	1.80
Valerianate . . . . .	76.06	33.70	0.029	0.0220	1.3
Sulphate, basic . . . . .	74.31	581.	0.0017	0.0012	1.34
Sulphovinate, neutral . . . . .	71.20	3.30	0.303	0.2150	1.39
		Very slightly soluble.			
Arseniate . . . . .	69.38	863.	0.0011	0.0007	1.44
Salicylate, basic . . . . .	68.79	820.	0.0012	0.0008	1.45
Citrate . . . . .	67.08	9.33	0.158	0.0958	1.49
Hydrobromate, neutral . . . . .	60.67	8.81	0.113	0.0668	1.64
Bisulphate . . . . .	59.12	800.	0.0012	0.00028	1.69
Tannate . . . . .	22.60				4.42

The sulphovinate is not official, but it can be studied in the reports of Schlagdenhauffer,<sup>747 362</sup> and Carles.<sup>746 359</sup>  
p. 194, 72; V. 1, 73; V. 6, p. 294, 76 Mar. 78; p. 602, 78

**Chlorine.**—Chlorine being one of the best disinfectants, and largely used for sanitary purposes, L. Vecherkevich,<sup>6</sup> describes a method by which it can be cheaply and easily made from bleaching powder and sulphuric acid.

**Chloroform.**—Unna<sup>28 9</sup> recommends chloroform-water as a valuable vehicle for the hypodermic administration of Fowler's solution and of ergotin, since it preserves the solutions from decomposition. It is also useful in the internal administration of drugs which decompose rapidly. Adamkiewicz<sup>31</sup> believes that he has obtained excellent results in neuralgias of the superficial nerves by the combined use of chloroform and the constant electrical current. The drug was introduced into a hollow charcoal electrode, from which the power of the current sends it into the tissues. Bianchi<sup>216</sup> reports 7 cases of dyspepsia and chronic gastritis, in most of which gastrectasia existed, in which he obtained remarkable results by washing out the stomach with very dilute chloroform-water. It diminished pain, lessened the intolerance of food, hindered the abnormal decomposition of its contents, and reduced dilatation through the reflex action caused by the sudden administration of the water. No unpleasant symptoms were observed. Ungar<sup>189</sup> claims that chloroform given as an anæsthetic tends to produce fatty degeneration of the heart. He

believes that death within a brief period after apparent recovery from chloroform narcosis is more frequently due to the drug than is usually supposed. F. Balzer and H. Klumpke<sup>24</sup><sub>Jan. 20</sub> consider that the relief following the local injection of chloroform in sciatica and other neuralgias is due to a coagulation of the nerve-tissue. There is, they say, a necrosis in the vicinity of the injection.

*Cobalt.*—(See *Nitrites.*)

*Coca—Cocaine.*—One of the most interesting articles on this subject which has come to our notice is that of H. H. Rusby,<sup>80</sup><sub>Mar., May</sub> who states that coca in its home and coca as exported are very different things. He describes the supporting power which he has seen the leaves exhibit when chewed by the Indians of some parts of Northern Bolivia, and says that he never witnessed bad results produced by the habit; while without the use of the plant it would be impossible to accomplish the labor to which the natives are subjected. It is also used by them in digestive troubles, and is especially valuable in pain from overeating and in true colic. Many cases of asthma and of acute cold are relieved by it, and it has the reputation of an aphrodisiac and emmenagogue. In nervous exhaustion from drunkenness or any other cause its good effects are immediate and marked. It does not act in these cases as a narcotic, but removes the mental confusion and nervous excitement and sensitiveness. The author has himself made chemical analyses of the drug and has had them made by others. These show conclusively that there are substances in the fresh leaves not found in those which have been exported. The sustaining effect of coca as witnessed in Bolivia is not so seen in this country, and it is evident that the real drug, coca, is practically unknown to the medical profession, and must remain so as long as they depend on the exported leaves. The action of the preparations from the latter is simply that of cocaine, and the evil effects sometimes following ingestion of this alkaloid are unknown among the users of the drug in its native place. That preparations may contain the full property of the leaf, it is necessary that they be made immediately after these are gathered and dried. No preparation of coca should be given immediately before eating, as it entirely abolishes the appetite. Rosenthal<sup>84</sup><sub>Feb.</sub> found that, through its increase of the arterial tension, cocaine in increasing doses was useful in the depressing form of neurasthenia, indicated by pain in the head and back, disturbance

of sleep and digestion, paleness of the face, periodical feelings of anxiety, small pulse, exhaustion, and mental inactivity. In the severe lancinating pains of tabes it was valuable in several instances, if administered hypodermically at the onset of the attack, its influence seeming to depend on the simultaneous increase of arterial tension. Its action was superior to that of morphine, napellina, and antipyrin in that it was not only more powerful, but that there was no depression following its use. In chronic dropsical affections injections of cocaine had a temporary effect in increasing diuresis. Its anæsthetic power may be exerted either centrally or peripherally. It proved itself valuable in bulimia when given throughout a long period of time. In certain forms of nervous cardialgia teaspoonful doses of a solution of 0.15 to 0.2 gram. ( $2\frac{1}{2}$  to 3 grains) in 150 gram. ( $\frac{3}{5}$ ) of water, given every 15 minutes, were serviceable. So also in nervous anorexia, hyperæsthesia of the gastric nerves, and the vomiting of pregnancy it may be given successfully in the same manner. Lastly, the ringing in the ears following the ingestion of quinine or salicylic acid may be prevented to a great degree by the simultaneous exhibition of cocaine in the proportion of 0.01 to 1. T. D. Dunn<sup>80</sup><sub>Aug. 15</sub> reports a number of cases of migraine in which the attacks were cut short by the hypodermic administration of  $\frac{1}{4}$  to  $\frac{1}{2}$  of a grain (0.016 to 0.049 gram.) of cocaine. It sometimes produced wakefulness or restlessness, but it was found that a small quantity of morphia combined with it not only prevented unpleasant secondary symptoms, but enhanced the effect of the cocaine. Dunn also tried this method in a troublesome case of bronchial asthma, with almost immediate relief of the dyspnœa. On subsequent occasions the relief was only temporary unless absolute rest was enjoined. He thinks the danger of a cocaine habit is greatly exaggerated. A. Hugenschmidt<sup>11</sup><sub>Sept. 15</sub> says that as toxic doses of cocaine produce cerebral anæmia, and that as the drug is particularly apt to cause accidents in anæmic and hysterical persons, he has, on this principle, administered an injection of it to a case of sun-stroke, and with the happiest effect. Souden,<sup>370</sup><sub>Oct.</sub> reported by corresponding editor Dr. Eklund, believes that injections of cocaine are useless in combating the morphia habit, and that there is great danger of adding to it the existence of an addiction to cocaine also. Cocaine has proved useful in vomiting, A. W. Kimball<sup>186</sup><sub>Mar.</sub> having

found teaspoonful doses of a solution of 1 grain (0.065 gram.) in an ounce of water very useful in overcoming regurgitation and other gastric disorders in a hysterical patient, after numerous other remedies had failed. Regnault,<sup>108</sup> also, records a few cases of sea-sickness in which a weak solution of cocaine had no effect, even when given in large quantities, while a much more concentrated one, either by the mouth or hypodermically, relieved the nausea and rendered eating possible. M. C. Corner,<sup>6</sup> relates an instance of obstinate vomiting relieved by the administration of 5 minims (0.32 gram.) of a 20 per cent. solution in a teaspoonful of cold water. Luton<sup>35</sup> <sup>9</sup> says that cocaine administered internally in doses of 25 gram. (3 6½) renders the urine, fæces, sweat, and the products of suppuration free from fetidity. He proposes, therefore, to employ it in this way as an antiseptic. Basing the practice on this property, he has tried it in small-pox, giving it by the mouth and hypodermically. It promptly lowers the temperature at the beginning of the disease, while if given at the eruptive stage it cuts the disease short, and the pustules desiccate. The treatment consists in the subcutaneous injection of 4 drops of a 20 per cent. solution three times a day, and the internal administration of doses of about ½ grain (0.032 gram.). Oblinski,<sup>84</sup> <sup>5</sup> recommends that an injection of cocaine be made at the seat of operation after chloroform has been administered, since by its stimulating action on the heart it is the best possible antidote to the paralyzing action of the anæsthetic. Under the head of the topical employment of cocaine may be noted the treatment of hyperæsthesia of the neck of the bladder and of the urethra by Rosenthal,<sup>84</sup> by small injections of a 5 per cent. solution. In this connection may be quoted an article by Hurry Fenwick,<sup>2</sup> who reports a series of cases in which neuralgias of various parts of the body, and often of long standing, had been temporarily removed in 30 to 180 seconds by a urethral injection of a 20 per cent. solution of cocaine. He concludes, from some experiments and from clinical observation, that slight nerve irritations can be relieved by these urethral injections, but that irritations of a severer nature—as the pains of inflammation or of carcinoma—cannot be thus benefited. This fact may be utilized in the diagnosis of urinary diseases, a renal pain immediately relieved by cocaine indicating a neuralgia from some slight cause, while if not so relieved it is probably due to



stone, dilated pelvis, or some other serious affection. The employment of cocaine for the relief of pain in obstetric practice is mentioned by Corner,<sup>6 Jan. 31</sup> who recommends vaginal suppositories containing 4 grains (0.26 gram.) to relieve the sufferings of the last part of the first stage and beginning of the second stage of labor. Hartshorne<sup>151 Feb. 16</sup> uses for the same purpose a mixture of cocaine, 6 parts; vaseline, 24 parts, and glycerine, 20 parts. This is to be injected by an ordinary glass syringe as high as possible into the vagina. He obtains with it a marked relief of the pains caused by the dilatation of the cervix and the expansion of the perineum. Tassell<sup>186 Jan.</sup> recommends a mixture of lanoline, 1 drachm (4 gram.); sulphate of morphia, 5 grains (0.32 gram.); muriate of cocaine, 3 grains (0.19 gram.); corrosive sublimate, 1 grain (0.065 gram.). A piece of this, the size of a pea, applied to a rigid os every 20 minutes is very serviceable in relieving pain in obstetric practice. R. O. Cotter<sup>207 July</sup> considers it an invaluable remedy in ophthalmic and nasal surgery, but great care must be used in its employment. Edmunds,<sup>6 Jan.</sup> recommends the injection of 5 grains (0.32 gram.) in 50 minims (3.2 gram.) of water into the tunica vagina after tapping a hydrocele and before the injection of iodine, 5 minutes later. In this way no pain or faintness is experienced. Lagerheim,<sup>370 Sept.</sup> (reported by Dr. Eklund, corresponding editor) speaks well of injections of cocaine in preventing the pain attending the extraction of teeth, and Kirk,<sup>9 Jan. 23</sup> recommends the drug to lessen the pain produced by devitalizing dental pulp with arsenic. L. Browne<sup>2 V. 1, p. 7, 1880</sup> has done away in his practice with the administration of chloroform in tracheotomy, substituting for it the injection of 5 drops of a 10 per cent. solution of cocaine on each side of the spot at which the trachea is to be opened. Ten to 12 minutes are allowed to elapse before beginning the operation. The author's favorable experience is based on about 40 cases. Cocaine given in this way not only is an anæsthetic, but deprives the part of blood. This hæmostatic power of the drug has been very frequently utilized by Gauthier<sup>212 Oct.</sup> in the treatment of capillary hæmorrhages from wounds. Either hypodermic injections were made in the neighborhood or tampons wet with a cocaine solution were applied. Finally, a formula for an ointment of cocaine is proposed, I believe, by Lustgarten,<sup>70 80 Jan. 14; Mar. 15</sup> to be used several times a day for the relief of herpes zoster or anal or vulvar pruritus. It consists of oleate of cocaine, 0.40 to 1 gram.

(6½ grains); lanoline, 18 gram. (3 4½); olive-oil, 2 gram. (3 ½). Regarding the employment of cocaine in ordinary surgical operations or injuries, Eversole<sup>65</sup> reports an interesting case where a very tender periurethral abscess was opened entirely without pain after the application of a solution of cocaine to the surface, followed by an injection of the same before the incision was made. A. Settler<sup>234</sup> gives his experience with cocaine in 18 cases of operations of various kinds on the urinary organs. In none of them were there any dangerous toxic symptoms seen, though 3 times there was severe headache and great dryness of the mouth. A 5 to 6 per cent. solution was generally employed. The best results were obtained in circumcisions, lithotrities, operations on preputial vegetations, and in internal urethrotomies. In the latter class the solution was injected into the urethra and allowed to remain there 25 minutes. In operations about the prepuce a solution of cocaine in glycerine and vaseline (1 to 15) was applied over its surface. In one case an 8 per cent. solution was also injected beneath the prepuce, but produced considerable headache. In lithotrity it is necessary that the solution be kept some time in contact with the mucous membrane of the bladder, in order to prevent contractions of the organ during aspiration. A. Piton<sup>185</sup> calls attention to the value of the drug in the slight traumatism so liable to occur in naval practice. The 3 indications for its use are (1) to allay pain; (2) to facilitate the examination of the wound; (3) to facilitate operation. The last two indications have to do principally with deeper wounds. It is well in these cases to give several hypodermic injections of 1 c.cm. each before beginning operation. If symptoms of poisoning arise revulsives locally and ether hypodermically should be employed. W. F. Rochelle<sup>186</sup> usually injects 1 or more grains (0.065 gram.) into the tissues and waits 5 minutes before making any incision. He uses 5 grains (0.32 gram.) to the drachm (3.8 gram.) of water as application to mucous membranes. Numerous instances are reported of disagreeable or *toxic effects* witnessed after the internal or local use of cocaine. T. P. Satterwhite<sup>224</sup> reviews over 100 cases of toxic symptoms produced by it and reported in the various journals, and concludes that, while the drug may be poisonous and even cause death in large doses, it may also be dangerous and even fatal in doses usually deemed safe. Toxic effects are by no means rare, and are most apt to

result when the drug is given under the skin. The risk should induce caution, and antidotes should always be at hand. These are nitrite of amyl, morphia, atropia, alcohol, ammonia, and digitalis. Szumann<sup>116</sup><sub>Na.S.; Nov.</sub><sup>5</sup> considers the safe dose of cocaine to be  $\frac{1}{2}$  to 1 grain (0.032 to 0.065 gram.) hypodermically, though the latter quantity is suitable only to robust individuals. Some patients, notably opium-eaters, will bear large amounts. With nervous patients and with those with cardiac disease or with cerebral congestion large doses may prove dangerous on account of the effect on the heart and circulation. Edmunds,<sup>6</sup><sub>Jan.</sub> cautions against the employment of a stronger solution than 5 per cent. in producing local anæsthesia. With this strength he has never experienced unpleasant effects, but with stronger solutions he has seen evidences of collapse. P. N. Barker,<sup>186</sup><sub>Apr.</sub> also, values the properties of cocaine, but warns against the possibility of the drug producing toxic results. R. O. Cotter<sup>207</sup><sub>July</sub> thinks the violent reaction following its application should prohibit its use in the treatment of congestive conditions of the nose and eyes. He has frequently seen unpleasant and even alarming constitutional effects follow. Quite a number of physicians report in detail examples of deleterious results from the use of cocaine. L. H. Broughton,<sup>43</sup><sub>July</sub> reports a case in which total unconsciousness, irregular and slow respiration, and retarded pulse were produced by 3 minims of a 20 per cent. solution placed in the cavity of a tooth. The patient recovered under the use of strychnia, which the author believes to be the antidote for cocaine poisoning. B. Pitts,<sup>6</sup><sub>Dec. 24, '87</sub> too, cites a case with very alarming symptoms of poisoning in a boy to whom an injection of not quite  $1\frac{1}{2}$  grains (0.1 gram.) had been given, and D. Mowat<sup>6</sup><sub>Oct. 18</sub> saw threatening symptoms in a man who had received about  $1\frac{1}{2}$  grains (0.1 gram.) of the drug hypodermically. A. W. Addinsell<sup>6</sup><sub>May 5</sub> reports 2 cases in which great excitement, rapid and weak cardiac action, etc., were produced by the hypodermic injection of 1 grain (0.065 gram.) of cocaine; D. S. Booth<sup>189</sup><sub>Oct.</sub> relates an instance of poisoning from the urethral injection of 10 grains (0.65 gram.), the principal symptom being a state of intense delirious excitement, with a sense of superabundant activity, and Moizard<sup>118</sup><sub>Nov.</sub> saw a child of 4 years poisoned by the ingestion of 0.25 gram. ( $3\frac{1}{2}$  grains), the symptoms being very difficult respiration, nausea, hallucinations, and muscular

agitation. Dudley<sup>27</sup> reports 3 cases in which  $1\frac{1}{2}$  grains (0.1 gram.) injected hypodermically produced symptoms of poisoning, great depression existing in all of them. McN. Whistler<sup>15</sup> has twice seen vertigo and threatening syncope after applying to the nasal cavities a solution of cocaine stronger than 4 per cent. When used in the form of a spray a solution of even less strength than this may produce general symptoms, consisting of a sense of exhilaration and a feeling of increased vigor. It is best, therefore, to apply no more than 10 drops at a time, and not to repeat this too often. F. Fox<sup>2</sup> Feb. 18 reports a case where spraying the throat for 15 minutes with a 2 per cent. solution of cocaine produced coldness, numbness of the tongue, weakness of the lower limbs, staggering, depression, and finally unconsciousness lasting several hours, and W. Rickert<sup>104</sup> May 5 tells of an instance in which the patient became almost moribund after the application of a 4 per cent. solution of cocaine in glossitis. Recovery took place under restoratives, but a second application of the solution produced the same symptoms. An editorial<sup>43</sup> warns against the solution of cocaine in petrolatum or oleic acid. Contrary to all expectation, the writer found that the preparation, applied to the eye, urethra, or vagina, produced intense pain, and he reports several cases in which this occurred. A curious idiosyncrasy to the action of cocaine is described by F. H. Potter<sup>130</sup> Feb. The application of a 4 per cent. solution of cocaine to the nasopharynx of the patient was always followed within 1 to 2 minutes by an inclination to stool, sometimes so strong that it could not be resisted, if the amount used had been large. Other remedies applied in the same way with the intent to deceive failed to produce this desire.

*Cocculus Indicus (Picrotoxine).*—Mary P. Jacobi<sup>1</sup> July 14 tried cocculus indicus in 3 cases of dysmenorrhœa, and found it very useful in relieving the pain when administered in doses of 3 drops every 4 hours, beginning 3 days before menstruation appeared and continuing during the period. She also reports a case of *petit mal* cured by  $\frac{1}{80}$  of a grain (0.00108 gram.) of picrotoxine 4 times a day, after the bromides had failed. The drug may be used whenever there is desired an increased tonus or energy of action of the ganglionic tissue of the brain and spinal cord, by which the excitability of vasomotor mechanisms and of the respiratory centre

is restrained, respiration rendered more energetic, and circulation steadier and more ample.

*Cod-liver Oil (Morrhual).*—W. B. Morrison<sup>186</sup> speaks of the great annoyance caused many individuals by the eructations occurring after the ingestion of cod-liver oil. Under these conditions its administration is worse than useless. He avoids all difficulty by giving the pure oil once a day on retiring for the night. No food should be eaten after taking it or immediately before. Only a half teaspoonful should be the initial dose, to be increased to a full ounce (31 gram.) if it is well borne, as it usually is. Eructations of gas rarely follow this mode. G. Sée<sup>39</sup> says that cod-liver oil always ends by fatiguing the digestive organs at the end of some weeks. In this case he employs with success morrhual, about which it is certain that it is well tolerated, is absorbed, and that its anti-nutritive action approaches that of the oil. Another writer<sup>84</sup> has given morrhual to numerous scrofulous individuals with glandular enlargement, the dose being 6 capsules daily. An equal number of patients were treated with the oil itself. After 3 months' trial and careful comparison he declares that his success with morrhual was complete, and that it acts with surprising promptness and certainty. As examples of its action he gives the history of 3 cases. Chasseaud<sup>67</sup> has made numerous observations on the value of morrhual in numerous well-marked cases of phthisis. After treatment lasting up to 1½ months all the cases exhibited remarkable improvement in all their symptoms. He believes that all the effects can be obtained with it which are sought for with cod-liver oil.

*Colchicum.*—I. B. Yeo<sup>2</sup> finds colchicum one of the most valuable remedies in the uric acid diathesis when judiciously given, and believes that the prejudice against it is absurd. So far from being a vascular depressant, he has seen it give strength and regularity to a feeble and irregular pulse in a case of chronic gout with subacute exacerbations.

*Collinsonia Canadensis.*—Oliver<sup>6</sup> reports a case of severe cystitis in a boy of 12 years of age, cured by the administration of 15 minims (1 gram.) of the fluid extract of collinsonia canadensis three times a day, other remedies having failed.

*Conium.*—Whitla<sup>15</sup> recommends conium as a local anæsthetic in painful diseases of the rectum and anus. The usual local seda-

tives have been found to give very uncertain results in this class of cases, and sometimes even to aggravate the symptoms. The ordinary extract of conium is also most uncertain, and the author consequently recommends a preparation made by evaporating 2 fluidounces (62 gram.) of the succus conii by gentle heat, until the bulk is reduced to about  $1\frac{1}{2}$  to 2 drachms (5.8 to 7.8 gram.). The syrupy liquid is then triturated with enough lanoline to make 1 ounce (31 gram.). He used this in several rectal cases in which severe pain and intolerable itching were prominent features, and obtained speedy relief after nearly every known remedy had failed. It should be freely smeared within the rectum, and carried some distance upward. He cannot recollect a single instance in which the ointment caused inconvenience. He has likewise obtained relief with it in vaginismus and some affections of the male urethra.

*Corn-Silk*.—(See *Stigmata Maidis*.)

*Creolin*.—Since the first recommendation of creolin, as quoted in the ANNUAL of 1888, the medical press has frequently contained further notes concerning it. It has been used locally for its antiseptic action on wounds, as for its influence on such conditions as cystitis and tonsillitis. It has also been given internally, also with the idea of antiseptis in view. M. Kortüm<sup>336</sup> July 28 found a  $\frac{1}{2}$  to 2 per cent. solution valuable as a wash or on compresses in dressing wounds of all sorts, especially where there was an offensive discharge. Abundant granulations appeared in some cases of ulcer which had been vainly treated with iodoform and by other approved methods. He found it also a styptic, and succeeded in stopping parenchymatous hæmorrhage with a creolin tampon more quickly than ever before. In a solution of  $\frac{1}{4}$  in 1000 it is useful in gonorrhœa, both of men and women, and for washing out the bladder in cystitis. A 2 per cent. solution is serviceable for disinfecting the hands and instruments, and has no injurious effect on either. In the strength of 5 per cent. to 10 per cent. in oil, it may be employed with success against scabies or pediculi. He has used it in obstetrics for washing out the vagina and uterus, with especial advantage in lacerations of the perineum, and with quite unexpected success in a case of uterine inertia, by tamponing the cavity of the uterus. Neudörfer<sup>3 57</sup> Feb. 15; Oct. 28 has found injections of a 1 in 1000 solution of creolin cure blenor-rhagia in 3 to 4 days. He has used a salve of it with success in

conjunctivitis and in opacity of the cornea. As an application in erysipelas and as an antiseptic dressing in general it is trustworthy and convenient, as well as cheap and harmless. Internally it may be given in doses of 0.09 to 0.12 gram. ( $1\frac{1}{2}$  to  $1\frac{1}{2}$  grains) daily, as an alterative. A. Hiller<sup>60</sup><sub>July 5; July 22</sub> considers that the most important antizymotic action of creolin is shown in the stomach and intestines in the diseases of which it forms an ideal antiseptic. In doses of 3 to 5 grains (0.19 to 0.32 gram.), in strong gelatine capsules, given three times a day, it promptly relieves meteorism, from whatever cause. It may thus be valuable in preventing perforation in typhoid fever. He has further found it of service in simple flatulence, acute and chronic gastric catarrh, and diarrhoea. Its action was prompt as an antiparasitic in a case of tænia and in one of oxyuris. In the strength of 1 in 500 it may be used as an injection in purulent cystitis and in carcinoma of the rectum. Creolin appears unfitted for children on account of their inability to swallow capsules. Jessner<sup>41</sup><sub>Dec. 27, '97; Jan. 14</sub> obtained immediate and really remarkable improvement in a persistent and very painful case of cystitis by using daily injections of a solution of 1 in 500. The patient had suffered for years, and all conceivable means had previously been employed with little success. Spaeth<sup>34</sup><sub>Nov. 4</sub> employed a 2 per cent. solution as a dressing for burns, varicose ulcers, and suppurating wounds, and always with excellent results. Necrotic parts were detached and granulations produced more speedily than by iodol, iodoform, or other applications. In prescribing it internally, <sup>34</sup><sub>Apr. 10; June 9</sub> he gives it in the formula: Creolin,  $3\frac{1}{2}$ ; tragacanth. pulv.,  $3\frac{1}{2}$ ; spirit. dilut.,  $3\frac{1}{2}$  (each 1.9 gram.); glycyrrhiz. pulv., 36, (5.8 gram.); muc. gum. acac., q. s. Ft. pil. 200. One pill 2 to 3 times daily. Baumm<sup>317</sup><sub>Nov. 20; July 80</sub> has employed the drug in his obstetric practice with very favorable results. He syringes the vagina before and after labor with a  $\frac{1}{2}$  per cent. solution, and uses the same strength as a wash for the hands. A 2 per cent. solution often causes rather severe burning of the genitals, and one of 3 per cent. may produce erythema. Thirteen cases of ruptured perineum were dressed with a  $\frac{1}{2}$  per cent. solution, and the appearance of the wound was more healthy than had been found with any dressings previously employed. In 2 cases a 2 per cent. solution was used for washing out the uterus, but one of the women suddenly fainted while receiving the injection, and afterward suffered

from sickness, ringing in the ears, and giddiness for some hours, while later in the day the urine was dark-colored. Although there had been post-partum hæmorrhage which might have produced these symptoms, the author thinks it possible that they were due to creolin poisoning. He tried a weak solution for cracked nipples, but does not recommend it. A 2 per cent. solution is a good application for pediculi pubis. Creolin acts upon elastic catheters in the same way as carbolic acid. V. Martini<sup>57</sup><sub>Sept. 2</sub> has employed creolin in pulmonary tuberculosis in doses of 1 to 2 gram. (15 to 30 grains) a day, but has not been able to see that it had any influence on the progress of the disease or relieved the symptoms. Born<sup>317</sup><sub>Nov. 20</sub>, <sup>90</sup><sub>July</sub> reports 124 midwifery cases in which a 1 per cent. to 2 per cent. solution of creolin was employed. In a few cases intrauterine injections were employed, and with only good results. He considers it at least as good as carbolic acid, while it is less irritating to the skin and does not produce the same roughness and rigidity of the vagina. It is harmless as far as his experience goes. Amon<sup>34</sup><sub>June 26</sub>, <sup>9</sup><sub>July 21</sub> recommends inhalations of  $\frac{1}{4}$  per cent. to 2 per cent. solutions in pulmonary tuberculosis. Expectoration is facilitated and its fœtor is removed, and in some cases where the infiltration involves only the apices or small areas in an upper lobe good results have been produced. He has also used it locally in diphtheria and in scrofulous and phlyctenular conjunctivitis and keratitis. Klamann<sup>6</sup><sub>July 14</sub> confines himself to dry creolin dressings, since he finds that moist applications of more than 2 per cent. produce unbearable pain. For burns a 1 per cent. creolin-oil acts very well. Rausche<sup>336</sup><sub>May 26</sub>, <sup>26</sup><sub>Aug. 1</sub> recommends a  $\frac{1}{2}$  per cent. to 1 per cent. solution for disinfecting hands, instruments, bandages, etc., in operations, and as a useful promoter of granulations. He has also had good results with a gargle of  $\frac{1}{4}$  per cent. to 1 per cent. in infectious diseases of the throat. E. O. Otis<sup>99</sup><sub>Aug. 9</sub> has found the drug very serviceable in all cases in which an antiseptic is indicated. He has discontinued the employment of flaxseed poultices, substituting for them a wad of absorbent cotton wrung out in a solution of creolin and bandaged on the wound. Fröhner<sup>1</sup><sub>Mar. 21</sub> has found it serviceable in scabies; as an antiseptic; in chronic non-parasitic eczemas, as an inhalation; in infectious bronchitis and bronchopneumonia; in infectious or zymotic gastric or intestinal catarrh. The dose for internal administration should be 1 to 2 gram. (15



to 30 grains ) of a 1 per cent. solution. M. Pleskoff<sup>116</sup><sub>Oct</sub> has used it in the treatment of affections of the nose and throat. A long cotton plug wet with a 1 per cent. solution was placed in each nostril of patients with chronic rhinitis, and in pharyngitis sicca a similar plug was pushed backward through the nose until it pressed against the posterior pharyngeal wall. He reports several cases in detail, and says that in all the success was such as to prove creolin an excellent means for treating these affections. J. Munk<sup>57</sup><sub>Sept 9</sub> reports several cases in which he used creolin locally as an antiseptic and parasiticide. Schnitzler<sup>22</sup><sub>Aug. 22</sub> found an aqueous solution of creolin, used as a gargle or mouth-wash, of service in angina follicularis and thrush, also of benefit in parenchymatous and phlegmonous tonsillitis, and especially in tubercular laryngitis. In the latter affection it was employed both locally and internally, with decided improvement in the local condition and relief of the other symptoms.

*Creasote—Guaiacol.*—Creasote has received renewed attention during the year, particularly in regard to its employment in phthisis, formerly so strongly advocated. Groh<sup>650</sup><sub>Nov. 27</sub> administers creasote thoroughly mixed with cacao powder and inclosed in cachets. Increasing the dose in this way up to 25 drops daily, he observed great improvement in the general health of a patient with much enlarged cervical glands, while the enlargement disappeared. He used it internally and locally in a case of carcinoma of the breast and found the nodules grow smaller. Lanisiée<sup>17</sup><sub>Apr. 22</sub>, <sup>2</sup><sub>June 23</sub> finds that creasote is better borne in combination with balsam of tolu and Norway pitch, both of which aid its action in pulmonary diseases. For this purpose 0.05 gram. ( $\frac{1}{4}$  grain) of creasote, 0.75 (11 grains) of tolu balsam, and 0.75 (11 grains) of Norway pitch are combined in one capsule. In serious cases 4 capsules should be taken morning and evening, and the dose increased, if necessary, to 12 a day. They should be taken at meal-time and a little water swallowed after them. Bushuyeff<sup>6</sup><sub>Jan. 22</sub> treated 20 cases of phthisis with creasote during from 1 to 6 months, the usual dose being 3 drops three times a day. Cases in the first and second stages of the disease were greatly benefited, but those in the third stage were unimproved by it. In only one instance were there unfavorable results, these being acute nephritis and anasarca in a patient who had taken 6 drops t. d. for three days. Wildhagen<sup>139</sup><sub>Mar.</sub> has found the drug

valuable in phthisis with consolidation, but without cavity. Beginning with 1 to 2 drops t. d., he increases to 7 to 10 drops at a dose. The experience of Hopmann<sup>4</sup><sub>No. 22, '97</sub> in several thousand cases of laryngeal and pulmonary phthisis during the last 10 years has been very favorable. Even in the advanced cases of phthisis there was at least relief and sometimes improvement obtained. The medicine must be discontinued during hæmoptysis. He gives it in doses of 0.6 gram. (9 grains) or more, daily, and without injurious results. It increases the appetite and the power of assimilation. Legroux<sup>228</sup><sub>Feb. 15</sub> treated 68 cases of diphtheria with creasote, with 30 recoveries. Among those tracheotomized 1 out of 3 got well. The remedy was used by atomization of a weak solution, or applied on a brush to the throat, and was given hypodermically in very severe cases. Soltmann<sup>113</sup><sub>Apr. 22</sub> gives 2 to 7 drops a day to children with chronic pulmonary affections and finds it well borne. It produces a rapid increase of weight, diminution of cough and expectoration, and gradual disappearance of the pathological conditions. Rosenbusch<sup>113</sup><sub>June 10; Aug.</sub><sup>147</sup> has had what he claims are remarkable results from intrapulmonary injections of creasote in phthisis. A  $\frac{1}{2}$  per cent. solution in almond-oil was employed. No bad effects were observed except hæmoptysis in one instance. The point chosen for the injection was the second intercostal space or the supraspinous fossæ. J. Rosenthal<sup>4</sup><sub>Nov. 22, '33; Oct. 13</sub><sup>9</sup> recommends the administration of creasote to tuberculous patients in carbonic acid water, containing to the pint 9 to 18 grains (0.58 to 1.16 gram.) of the pure drug and an ounce of cognac. The dose is to be increased until 12 grains (0.8 gram.) are taken daily. *Guaiacol*, having been determined by Petzold to be the active principle of creasote, Sahli<sup>214</sup><sub>Oct. 15, '97</sub> recommends it in phthisis on the ground that it is a more definite body and has a more constant action. The dose and form of administration are the same. He found it diminish the cough and expectoration in the milder forms of phthisis, while the appetite and general condition often increased. Its taste and odor are more pleasant than that of creasote. Its administration must be continued for months. Some patients, especially those with elevated temperature, do not bear it well, as it occasionally causes diarrhœa. It is indicated in the less severe forms of the disease, where a permanent cure is to be hoped for. The author sometimes combines it with cod-liver oil. Fräntzel<sup>41</sup><sub>Feb. 12</sub> considers it fully equivalent to creasote. J. Horner<sup>88</sup><sub>No. 17</sub> has

for four years given guaiacol in pulmonary tuberculosis, and finds the results in many cases good, and sometimes surprisingly so. Usually the appetite is promptly restored and the cough, fever, expectoration, and number of bacilli diminished. Little is to be hoped from it in very advanced cases. The dose is 0.05 gram. ( $\frac{1}{2}$  grain) in pill, and the number of pills is to be increased from 3 to 10 daily. The author never observed unpleasant symptoms follow the use of guaiacol, and most patients take it without difficulty.

*Cuprum (Copper).*—Luton<sup>177</sup> believes that in the *phosphate of copper* we have a specific for tuberculosis. It must, however, be in a nascent state, and soluble in an alkaline medium. It may be given in pills, each containing acetate of copper, 0.01 gram. ( $\frac{1}{2}$  grain); crystallized phosphate of soda, 0.05 gram. ( $\frac{1}{2}$  grain); powdered liquorice and glycerine, q.s. Blanc<sup>12</sup> has treated 27 cases of ringworm of the scalp with the *oleate of copper* made into an ointment with vaseline or lanoline in the strength of  $3\frac{1}{2}$  to 31 (2 to 30 gram.). The hair was cut as close as possible, the scalp scrubbed once a day, and the salve applied night and morning. The application was soothing and valuable in those cases which had formed kerion. Epilation was not practiced in any of the cases. The average duration of the disease was 4 months and 4 days, while usually it lasts in public institutions some 6 months. The remedy was found in all respects superior to chrysarobin.

*Curare.*—Planchon<sup>26</sup> has shown that the Indians of the Orinoco prepare 2 kinds of curare—one a relatively mild poison, used in the chase, from the *strychnos gubleri*; the other, a strong kind, made from the *strychnos toxifera*.

*Cytisus Laburnum (Cytisin).*—Kracpelin<sup>6</sup> has found cytisin, the active principle of laburnum, valuable in migraine of a paralytic type, *i.e.*, due to a dilated condition of the vessels. He reports the case of a hysterical woman with very violent attacks of migraine relieved immediately by the hypodermic injection of 0.003 gram. ( $\frac{1}{20}$  grain) of nitrate of cytisin, after all ordinary remedies had proved useless. Once it was administered by the mouth, but caused vomiting. In cases where migraine was accompanied by a large element of spasmodic action, it had a negative or even injurious effect.

*Delphinium (Larkspur).*—Krasnogradoff and Sklotovsky<sup>108</sup> refer to the popular use of the root of delphinium consolida as a dressing for wounds, and the former reports a case where an elderly woman cured herself of extensive and persistent crural ulcers by its internal and external use. Debierre<sup>296</sup> <sup>1</sup>/<sub>10</sub> says that delphinine, an alkaloid obtained from the seeds of delphinium staphisagria, is useful in facial neuralgia, chronic rheumatism, palpitation of the heart, and convulsive affections in doses of  $\frac{1}{80}$  to  $\frac{1}{10}$  grain (0.00108 to 0.0065 gram.).

*Digitalis.*—James Stewart<sup>22</sup> <sup>Mar. 21</sup> points out that in serious heart-failure the best results are obtained by rest in bed and full doses of digitalis, the supply of liquids being curtailed to a minimum. When this treatment does good, diuresis will be increased. It is important to remember that when the amount of urine falls after increasing under digitalis, the administration of the drug should be at once suspended. Serious risk is caused by non-attention to this rule. The author usually gives 40 minims (2.6 gram.) of the tincture 4 times daily during 3 days, but as much as half an ounce a day is sometimes required. H. Huchard,<sup>203</sup> <sup>July 18</sup> in discussing the indications for the employment of digitalis, says that it is useless in the condition of compensation, of especial value in transitory asystole with venous stasis from asthenic conditions of the vessels and the heart-muscle, harmful in hypertrophy of the heart with increased arterial tension, and harmful in permanent asystole with greatly embarrassed circulation and irremediable fibroid changes of the cardiac muscle. In this latter condition increasing the dose of digitalis may only add a digitalis asystole to the valvular asystole, since the heart will not respond to the drug. To insure a good result with digitalis in suitable cases, it is necessary to precede its employment by diminishing the work which the heart has to do. This is to be done by relieving the venous engorgement and œdema by general and local blood-letting, purgatives, paracentesis, punctures of the œdematous limbs, etc. In giving digitalis, the condition of the cardiac muscle is of much greater importance than the nature of the valvular lesion. In the use of the drug in palpitation it is necessary to determine the nature of the affection, since the palpitations from Grave's disease, anæmia, tobacco, tea, and coffee are not benefited by it. Cardiac arrhythmia is to be treated by digitalis if it be due to valvular lesions, but if of myopathic origin, or reflex,

toxic, or nervous in its nature, the drug will certainly be useless. G. Stücker<sup>116</sup> says that there are certain conditions in which digitalis does not act in the way expected of it, and in these we must sometimes use with it other remedies as aids. When there is very greatly diminished arterial tension, as in aortic insufficiency, idiopathic dilatation, certain stages of arterio-sclerosis, and sometimes after violent bodily exertion, he advises that with the digitalis ergot be given. When, on the other hand, there is greatly increased arterial pressure, as in chronic nephritis, combined with increased rapidity, and with irregularity of the heart's action, digitalis alone might not be safe. It may, however, be given if the tension be first reduced with nitroglycerine or other nitrites. Probably caffein is to be preferred to digitalis in these cases. In still other instances digitalis fails to act without any discoverable reason. This being the case, he has sometimes found that an ice-bag laid over the heart will soon bring about a satisfactory action of the digitalis.

*Embelia Ribes*.—C. J. H. Warden<sup>26</sup> has found that the active principle of this plant, embelic acid, when combined with ammonia, forms an efficient remedy for tape-worm where other tænicides do not succeed. It is tasteless, and may be given in doses of 3 grains (0.2 gram.) to children or 6 grains (0.4 gram.) to adults, dissolved in honey and syrup. Castor-oil should be exhibited previously and subsequently.

*Ergot*.—The observations made upon the employment of ergot by different writers during 1888 have not been very numerous, but treat of quite a number of diseases. W. W. Essick<sup>188</sup> successfully treated 3 cases of hæmorrhoids by injecting fluid extract of ergot into the tumors, never repeating the procedure more than twice. Jaroschewski<sup>21</sup> has tried ergot in 24 cases of intermittent fever, but comes to the conclusion that it is entirely without influence upon it, or upon the enlargement of the spleen attending it. Von der Goltz<sup>150</sup> has had excellent results with ergotin in migraine, the attack sometimes ceasing abruptly after the hypodermic administration of the drug. Out of 30 individuals treated in this way with 151 injections, success was attained in 20 cases. J. W. Hyde<sup>31</sup> says that ergot given prior to delivery produces a frightful mortality among infants, and is the most frequent cause of retention of the placenta, as well as of other abnormal conditions. He claims that it is never

necessary except hypodermically in dangerous post-partum hæmorrhage in rare cases. Schücking<sup>317 Feb. 25</sup> recommends the treatment of uterine fibroids by the injection of fresh, pure solutions of ergotin into the cervical portion of the uterus. With an absolutely clean needle he has never had any bad results, and the method is far superior to any other. The needle should be inserted for not more than  $\frac{1}{8}$  to  $\frac{1}{4}$  of an inch into the anterior or posterior lip, but never into the body of the uterus or into the tumor itself. The point of election for the injection of ergot and the preparation to be employed have been a matter of some discussion. G. V. Hale<sup>85 July</sup> has for some years used normal liquid ergot (Parke, Davis & Co.) hypodermically, making the injection in the abdominal parietes, and in no case has he produced nodules or other unpleasant results. Lilienfeld<sup>317 Nov. 20, '97; 80 Mar.</sup> cites numerous cases to prove that hypodermic injections of ergotin should be given into the back or hips, and that the solution should be fresh, made, if possible, at the bedside. Engelmann<sup>317 No. 1; 90 Apr.</sup> thinks that symptoms of local irritation will not follow injections of ergotin unless decomposition has taken place in the fluid, and refers to a method of preparation which he has previously described. The site of the injection is a matter of indifference, except that in his opinion the abdominal parietes should not be chosen. The ergot of oats has been tried by Bousquet<sup>154 Feb. 15</sup> in 8 cases, and found to equal that of rye, while it has a more general stimulant action.

*Erythrophlæin*.—The clinical reports on the value of this new anæsthetic are decidedly contradictory. The weight of evidence, however, seems to indicate that the drug is not fitted to find a permanent place in our materia medica. F. Goldschmidt<sup>319 No. 7; 9 Mar. 10</sup> was able, by means of the complete anæsthesia it produced, painlessly to remove fragments of iron from the cornea and to slit up the lachrymal canal. A. v. Reuss<sup>41 Mar. 1</sup> confirms these results, but does not find the anæsthesia as complete as with cocaine, while the solution, in the strength of  $\frac{1}{4}$  per cent., produced temporary cloudiness of the cornea, with lachrymation and conjunctival hyperæmia. A. Königstein<sup>57 No. 8; 9 Mar. 10</sup> thinks the drug will find no employment in eye surgery on account of its very irritating properties. C. Güttmann<sup>69 Mar. 3</sup> reports a case where after 2 drops of a  $\frac{2}{10}$  solution cloudiness of the whole cornea, with anæsthesia, developed and persisted for over 10 days. F. Loewenhardt<sup>4 Mar. 1</sup> tried

injections of 3 millig. ( $\frac{1}{3}$  grain) in several cases of minor operations. Though some diminution of sensibility was produced, there was in no case a true anæsthesia. P. Guttman<sup>80</sup> found it to exert an anæsthetic action in neuralgias or chronic inflammations, when  $\frac{1}{200}$  to  $\frac{1}{100}$  of a grain was injected, or when a solution containing  $\frac{1}{82}$  (0.002 gram.) of a grain was painted on granulating wounds. Tweedy<sup>6</sup> has applied erythrophlæin to many human eyes, but has failed to observe any anæsthetic effects, while the burning and irritation produced was considerable. Karewski<sup>41</sup> concludes that the drug cannot become of great use as an anæsthetic in operative procedures, as its action is too slow and too uncertain, and it produces too many unpleasant secondary effects. It is, however, of value in neuralgias of different kinds. Koller<sup>84</sup> dropped some of the solution into his own eye, where it produced severe burning pain, extending over the face, followed by anæsthesia of the cornea, with cloudiness lasting two days. Epstein<sup>319</sup> considers erythrophlæin far inferior to cocaine. He has tried it as an addition to mercurial preparations for hypodermic injection, and though it produced temporary anæsthesia, it was followed by pain so much the more intense. Lipp<sup>84</sup> found subcutaneous injections of erythrophlæin irritating. Where more than 0.005 gram. ( $\frac{1}{20}$  grain) was employed infiltration of the skin developed, often lasting eight days. Besides the first anæsthesia at the point of injection, there is what he calls a "secondary" anæsthesia, extending for 6 to 20 ctm. around it. Panas<sup>3</sup> considers the anæsthetic power of erythrophlæin in the eye not less than that of cocaine. On account of the pain which it at first produces and its irritating properties, it is unfitted for most operations. It may, however, be of service in prolonging the anæsthesia produced by cocaine. L. Brandt<sup>116</sup> reports 3 out of 10 cases in which he gave injections of 0.001 gram. ( $\frac{1}{100}$  grain) erythrophlæin into the gum for toothache. In all of them the pain produced was worse than the disease itself, and in all hyperæmia of the conjunctiva developed. Sometimes, too, the cheek became much swollen. Welcker<sup>116</sup> also concludes that on account of the irritation which it calls forth it is not to be compared to cocaine for use in the eye. M. Kaposi<sup>116</sup> says that the drug produces anæsthesia, but only of very limited area, and that it calls forth symptoms of general poisoning. A trial of the properties of erythrophlæin when given internally was made by

Hermann,<sup>169</sup><sup>5</sup><sub>Oct.; Dec.</sub> who used it in various forms of heart-disease, giving 10 drops every hour of a solution containing gr.  $\frac{1}{5}$  (0.008 gram.) to the drachm (4 gram.) of cherry-laurel water. It sometimes reduced the frequency of the pulse and increased diuresis, but its action was by no means so good as that of strophanthus.

*Ether*.—Testevin<sup>303</sup><sup>9</sup><sub>Aug. 6; Sept. 1</sub> reports brilliant results from the subcutaneous injection of ether in the case of a woman apparently moribund from the fumes of burning charcoal, other remedies having been used in vain. Bamberger<sup>61</sup><sub>Oct. 30</sub> records an instance in which injections of ether relieved a grave case of cardiac insufficiency due to fatty degeneration of the heart. The secretion of urine was greatly augmented, and the dropsy and dyspnoea diminished. A. Torre<sup>67</sup><sup>80</sup><sub>Feb. 15; Apr.</sub> injects the vapor of ether into the rectum in lead colic. It calms the spasmodic state and renders the action of purgatives less irritating. He attaches a rubber tube to a small bottle of ether, passes the end into the rectum, and places the bottle in warm water.

*Eucalyptus Globulus*.—J. R. Vanderveer<sup>40</sup><sub>May</sub> has found the oil of eucalyptus a useful remedy in lingering colds with profuse expectoration. He has used it externally with great satisfaction in acute and chronic rhinitis, either in the form of the fluid extract, or as an ointment with vaseline. It has further proved serviceable as an antiseptic in gynæcological practice. Segur<sup>40</sup><sub>May</sub> has used it in bronchitis with uniformly favorable results, and Paine<sup>40</sup><sub>May</sub> commends it for the same purpose. Rochester<sup>40</sup><sub>May</sub> has found the oil of service in gynæcological work, where there was pelvic pain with or without cellulitis. He also in one instance promptly stopped epistaxis by a plug of cotton saturated with it. F. Balzer and A. Klumpke<sup>24</sup><sub>Jan. 20</sub> have found eucalyptol dissolved in oil a useful remedy in bronchitis when given hypodermically. The injections cause but little pain, and the drug is rapidly absorbed. E. Sheaf<sup>2</sup><sub>Apr. 21</sub> reports the case of a patient who took by mistake about 3 5 (20 gram.) of the extract of eucalyptus and suffered from faintness, giddiness, twitching, and a feeble and rapid pulse.

*Euphorbia Pilulifera*.—W. Jayesinghe<sup>174</sup><sub>Mar.</sub> tried the decoction of euphorbia pilulifera in a case of asthma and in one of chronic bronchitis. Both were obstinate cases of long standing, but were greatly and promptly relieved after a few doses. The quantity given was 3 2 (62 gram.) three times a day. I have recently used



this drug in 5 or 6 cases of asthma, depending in four instances on well-marked emphysema. Nothing but disappointment ensued, though the drug cannot, of course, be condemned from trial on such a limited number of patients.

*Fats.*—(See *Aliments*.)

*Felix Mas.*—Bayer<sup>6</sup><sub>Nov. 23</sub> describes very dangerous symptoms produced in a woman by 17 gram. (3 4½) of the extract of male fern taken in divided doses, with an equal amount of the extract of pomegranate. She became faint and prostrate, and lay for 30 hours comatose, awaking finally with one eye temporarily blind.

*Ferrum (Iron).*—Sée<sup>17</sup><sub>Aug. 5</sub> says that iron should not be given in the pseudo-anæmias, *i.e.*, in the forms due to inanition or emaciation, or in those caused by any intoxication, or of a specific nature. The drug is fitted for the true anæmia only. Under this heading he includes anæmia from loss of blood, chlorosis, spontaneous or pernicious anæmia. M. G. L. Hirschfeld<sup>2</sup><sub>Mar. 24</sub> reviews the subject of the hypodermic injection of iron, details his own experience, and concludes that its administration in this way is both excessively painful and inefficient in its results. J. Roussel<sup>24</sup><sub>Mar. 25</sub> on the other hand, finds injections of the salicylate of iron readily absorbed and painless. Chicandard<sup>31</sup><sub>Jan. 16</sub> suggests the use of the ammonio-ferrous sulphate, as it is rich in iron and quite soluble in water. Unlike the other ferrous salts, it does not speedily undergo chemical change on exposure to the air. Hequet<sup>17</sup><sub>Nov. 20, '97</sub><sup>26</sup><sub>Feb. 1</sub> has for nearly 20 years employed the bromide of iron in chlorosis, anæmia, amenorrhœa, hysteria, etc., and finds that it calms without depressing and invigorates without exciting. G. T. Fox<sup>176</sup><sub>Mar.</sub> has used ferrous mallate very extensively, finding that it produces neither nausea, constipation, headache, nor other unpleasant effects, while it is very palatable and readily assimilated. W. Judkins<sup>61</sup><sub>Jan. 21</sub> speaks highly of dialized iron as a remedy in diarrhœa in childhood, and in some cases in adults. He also finds it a very pleasant and efficacious means of administering iron in any case, and superior to the tincture of the chloride on account of the varying strength of the latter and the impurities which it contains. It is valuable as an antidote to arsenic, and the author quotes largely from an article by Bullard to prove that it is useful as a preventive of poisoning in those exposed to arsenical fumes. H. L. Wilder<sup>186</sup><sub>May</sub> maintains that in levulose ferride we have a preparation differing from other

forms of iron in that it is not detrimental to hepatic troubles. It is pleasant to take, is of alkaline reaction, is well borne by the stomach, and can be combined with different fluid extracts and tinctures without forming insoluble tannates. In the anæmia of young girls he has found it more rapidly efficient than any other preparations, and it can be prescribed with Fowler's solution if desired. Dumont,<sup>73</sup><sub>Feb.14; Mar.10</sub><sup>9</sup> claims that the albuminate of iron is more readily assimilable than other iron salts, less frequently occasions gastric disorder, and produces a rapid increase in the iron compounds of the blood elsewhere. The following formula is given<sup>67</sup><sub>Apr.20; June</sub><sup>9</sup> for its preparation: Dried egg-albumen, gr. 45 (3 gram.); cinnamon-water, 7½ ounces (217.7 gram.). Dissolve and add sol. of perchloride of iron, ½ drachm (2 gram.); distilled water, 10 drachms (3 2½); add ammonium hydrate, 15 minims (1 gram.). Shake; filter. The resulting liquid should be aromatic, reddish brown, and alkaline. It may be given in milk.

*Fluorine—Hydrofluoric Acid.*—H. Bergeron,<sup>24</sup><sub>Feb.28</sub> describes and illustrates an elaborate apparatus for administering the vapors of hydrofluoric acid with a chamber in which the patient shall sit. Another apparatus is proposed by Bardet,<sup>3</sup><sub>Feb.15</sub> who uses gaseous mixtures containing about  $\frac{1}{50}$  of hydrofluoric acid; still other forms are proposed by other writers. C. Paul,<sup>3</sup><sub>Feb.15</sub> considers these forms unnecessarily complicated, and makes use of an ordinary Wolff bottle. As the acid is quite poisonous, he prefers the vapors of fluoride of ammonium, in a solution of ½ in 1000. Féreol,<sup>3</sup><sub>Feb.15</sub> reports a case of phthisis apparently benefited by inhalations of the acid. Hérard,<sup>60</sup><sub>Feb.4</sub> also recommends the inhalations in phthisis, and claims that thereby the appetite returns, perspiration disappears, dyspnœa, cough, and expectoration are lessened, and the number of bacilli in the sputum is reduced. The patient takes 20 to 70 inhalations in a closet containing an atmosphere in which is a certain proportion of the vapor of hydrofluoric acid. Garcin,<sup>6</sup><sub>Feb.4</sub> has cured 35 and ameliorated 30 out of 100 cases of phthisis by exposing them for 1 hour daily to an atmosphere containing hydrofluoric acid. R. Lépine,<sup>3</sup><sub>Apr.15</sub> says that after several months of experimentation with hydrofluoric acid by inhalation in phthisis, he has not been able to observe any improvement in his cases, and that many of them have died; and Daremberg,<sup>2</sup><sub>Aug.25</sub> also obtained no good results whatever in phthisis. The sputa of patients submitted to it were never acid, which

proves its penetrating power to be insignificant. Goetz<sup>92</sup><sub>Aug. 30; Oct. 12</sub> has used the medicament quite extensively in phthisis, and concludes that its greatest value is in the very constant restoration of the appetite. The night-sweats are very often greatly diminished and the fever modified. Diarrhœa and cough are not much affected. The fluosilicate of sodium is recommended by W. Thomson,<sup>216</sup><sub>Jan.</sub> who says that a saturated solution is not irritating to wounds, while it is a better antiseptic than a 1 in 1000 solution of bichloride of mercury. It is not poisonous and is without odor. A. W. M. Robson<sup>2</sup><sub>May</sub> also reports his experience with it in 13 cases. He considers it an efficient antiseptic, and would prefer it to sublimate in all cases where there is danger of absorption. A solution of 1 grain (0.065 gram.) to the ounce is sufficient for ordinary purposes, and will not irritate the hands, though it corrodes steel instruments, and by long use acts on the glaze of porcelain. C. Berens,<sup>80</sup><sub>July</sub> after detailing extensive clinical experiments with sodium fluosilicate, concludes that it is practically harmless, that it is more efficient than either carbolic acid or sublimate, that it is extremely efficient in inflammatory states of the mucous membranes, and in conditions in any part of the body associated with the production of pus. T. E. Hayward<sup>2</sup><sub>Dec. 31, W.</sub> recommends the use of sodium fluosilicate in obstetrical practice.

*Fuchsin.*—Reiss<sup>80</sup><sub>Mar.</sub> treated 20 cases of acute and chronic nephritis with fuchsin with benefit to all. In 2 cases the effects, he says, were truly wonderful, the one, an instance of scarlatinal nephritis, being cured in 40 days, and the other, a patient with rheumatic nephritis, recovering in 8 weeks. The dose is 1 to 10 milligram. ( $\frac{1}{8}$  to  $\frac{1}{4}$  grain.) Another writer<sup>6</sup><sub>Jan.</sub> found fuchsin to rapidly reduce anasarca in several cases of Bright's disease.

*Gaultheria.*—Dercum<sup>242</sup><sub>Jan.</sub> finds that 10 to 20 minims (0.65 to 1.30 gram.) of the oil every 3 to 4 hours produce a marked ringing in the ears and subsidence of pain in 24 to 48 hours. In one instance of very painful muscular rheumatism he gave  $\frac{1}{2}$  drachm (1.94 gram.) every 2 hours, and 5 to 6 doses were taken before the stomach rebelled. Excessive cinchonism was produced, with nausea and rapid pulse, but the pain disappeared. J. G. Pinkham<sup>50</sup><sub>July 22</sub> reports the case of a young pregnant woman who took an ounce (31.10 gram.) of the oil of gaultheria, probably with suicidal intent. The principal symptoms produced were profuse

perspiration, pain in the head and abdomen, purging, frequent and painful and at last involuntary micturition, with convulsions, tonic spasms, abolition of sight and hearing, rapid respiration, depression of the heart's action, and finally death in 15 hours.

*Gelsemium*.—G. M. Garland<sup>89</sup><sub>Sept. 18</sub> knows of no drug equal to gelsemium in those crises of cerebral excitement which were formerly combated by asafoetida and valerian. It should be pushed until heaviness of the lids and diplopia result. It is also useful in the early stages of acute bronchitis and in neuralgias. For the latter affection 3 to 5 drops should be given every  $\frac{1}{2}$  to 1 hour, according to the intensity of the pain. He claims that this remedy can be used in all forms of organic disease of the heart without danger in ordinary doses; it has an agreeable taste, has no depressing after-effects, does not create a habit, and toxic symptoms, if they occur, appear early and with plenty of warning. W. F. Jackson<sup>90</sup><sub>Nov. 15</sub> considers gelsemium the remedy *par excellence* for neuralgias of the lower jaw and the acute congestive stage of cold in the head. Fifteen to 25 minims (0.97 to 1.62 gram.) of the fluid extract taken at night upon retiring will dispose of the latter affection. He has also found it very useful in dysuria from whatever cause, as well as in the treatment of gonorrhœa when given in full doses and combined with an alkali. J. N. Freeman<sup>27</sup><sub>Jan.</sub> has seen 2 fatal cases of poisoning from an overdose of the drug, both in children. The author has used it for years and considers it a most valuable remedy. He has given it with success in the intermittent fevers of children, with involvement of the nervous system, in fevers of dentition, dysentery, infantile rheumatism, convulsions, tetanus of the newborn, and meningitis. In chorea it is the best of all remedies. In the treatment of adults he has found it serviceable for the irregular early pains preceding actual labor and as a means for relaxing a rigid os. In both these conditions it has given him great satisfaction. Dysmenorrhœa and uterine and ovarian neuralgia are relieved or cured by it, and in hysteria and for irritable, nervous women he prefers it to any other remedy. The dose is 5 to 30 minims (0.32 to 1.94 gram.) of the tincture every 2 hours, increasing to 1 fluidrachm (3.89 gram.) unless the constitutional effects are produced by a less dose. It is well to commence with small doses, as some patients are peculiarly susceptible to it. These statements as to its value in neuralgias are

confirmed by Morrill<sup>27</sup> and B. Emmet.<sup>27</sup> Boldt<sup>27</sup> has found it serviceable in rigidity of the os and irregular contractions, and Mundé<sup>27</sup> and Goffe<sup>27</sup> have employed it with satisfaction in dysmenorrhœa.

*Glycerine.*—W. H. Morse<sup>104</sup><sub>Dec. 21, '97</sub> insists that only the vegetable glycerine should be employed, as that derived from the animal fats is thoroughly impure. Animal glycerine has not the same solvent powers, and is, moreover, liable to become rancid. The failures of various observers to corroborate the claims made for glycerine in phthisis and in diabetes has been due to the fact that they failed to use vegetable glycerine. For topical treatment, too, the animal glycerine is much inferior, since it dries more quickly. There will be no trouble with the decomposition of and deposition in the glycerita and in fluid extracts containing glycerine if the pure vegetable glycerine be employed. Dean<sup>61</sup><sub>Apr. 14</sub> has used injections of glycerine for oxyuris vermicularis. In a few minutes the worms shrivel up and are ejected. But by far the greatest point of interest regarding glycerine is its rectal administration for the relief of constipation, to which reference was made in the ANNUAL of last year. Further research shows, undoubtedly, that the use of glycerine for this purpose is but an old and largely forgotten custom, though it is uncertain who its originator was. The late Albert H. Smith, of Philadelphia, was in the habit of prescribing injections of it; and his former associate, H. A. Slocum, writes me that he still uses it with success. William Pepper has also prescribed it in numerous instances. Eustace Smith<sup>2</sup><sub>v. 2, p. 7</sub> refers to the value of the injection of from 40 to 60 drops of glycerine in the constipation of infants, and calls it "an old-fashioned plan lately revived;" and Cadogan-Masterman,<sup>2</sup><sub>v. 1, p. 122</sub> while administering a teaspoonful of glycerine per rectum in a case of herniotomy, heard the nurse remark, "That was Mr. Warden's favorite plan; he said it was better than all the pills in the world." And this physician, says the writer, died 16 years ago. Oliver<sup>1200</sup> also recommends the injection of a small quantity of glycerine into the rectum for constipation. The history of Anacker's discovery of glycerine as the active ingredient of Oidtmann's *purgatif* was given in brief in last year's ANNUAL. The chemical analyses by Birnbaum,<sup>575</sup><sub>No. 22, '97</sub> Mylius,<sup>575</sup><sub>No. 6, 22, '97</sub> Rupp,<sup>575</sup><sub>No. 22, '97</sub> Steensma,<sup>743</sup><sub>Apr. '97</sub> Anacker,<sup>69</sup><sub>No. 27, '97</sub> Guldensteenden-Egeling,<sup>743</sup><sub>June, '97</sub> and that made by the authority of the

*Land-Medicinal-Collegium*,<sup>34</sup><sub>No. 48, 47; No. 2</sub> of Saxony, have but confirmed the statement of Anacker. A little later than Anacker's paper, and without reference to Oidtmann's *purgatif*, a publication of Unger's<sup>575</sup><sub>No. 42, 47</sub> recommended the employment of glycerine in the form of suppositories with soap and *rhamnus frangula*, and stated that physicians had given them, as thus prepared by him, with very satisfactory results. In an article<sup>575</sup><sub>No. 16</sub> appearing nearly a year later he changes the formula considerably, while increasing the glycerine and diminishing the soap, as he says that there is no doubt the former is the active agent. He believes that the glycerine excites the mucous glands to greater secretion, and repudiates the theory of increased reflex peristalsis, as suggested by Anacker. Seifert,<sup>34</sup><sub>No. 2</sub> though bitterly opposed to patented medicines, had Oidtmann's *purgatif* so constantly forced on his attention that he tested its power and found that it fully met the claims made for it. Having heard of Anacker's discovery of the active constituent, he tried glycerine enemata in 26 cases, besides children, and found that 3.5 c.cm. (49 minims) at once produced a copious evacuation, without leaving any disagreeable sensation. In no case did he see the drug lose its effect, though sometimes given regularly for many months. Boas,<sup>69</sup><sub>No. 22</sub> has likewise used this treatment in a long series of cases with good results. In patients with hæmorrhoids, however, the insertion of any syringe may be productive of pain. At the best the use of a syringe is not altogether pleasant, is difficult for the patient himself to employ, and cannot always be prescribed in private practice. The author has accordingly devised another form of administration, and has in 20 cases employed hollow suppositories of cacao-butter, each containing 1 gram. (15 minims) of pure glycerine, this dose being found sufficiently large, and acting in 15 to 20 minutes. He never found it necessary to use more than one suppository, though there would be no objection to giving two. Kröll<sup>116</sup><sub>No. 1</sub> also favors the employment of cacao-butter suppositories containing at least 2 gram. (30 minims) of glycerine. The evacuation takes place in 5 to 15 minutes. He has used them in 50 cases, and with only one failure. While he has often seen glycerine injections produce an unpleasant sensation in the rectum, he has never known the suppositories to have this effect. He considers glycerine especially adapted to cases of constipation from insufficient peris-

talsis of the large intestine, caused by congestion of the portal system, or occurring in those leading sedentary lives, or confined to bed. The treatment does not lose its effect by repetition. Gerstacker<sup>116</sup><sub>Sept.</sub> took careful notice of 55 cases in which he employed enemata of about 2 gram. (30 minims) of glycerine. The results were very satisfactory, defæcation taking place shortly after the injection. The average time required was 8½ minutes, the shortest 2 minutes, and the longest 6 hours. Usually there was but one stool, and this soft; 11 times it was hard, and 4 times there were repeated evacuations. In no instance was there any unpleasant sensation after the evacuation. The author uses a small metal or glass syringe, to which he attaches a piece of rubber drainage tube ½ metre long. This simple device, he thinks, removes the objections raised by Boas, since the patient can very conveniently and without assistance give himself the injection while lying on the back. Schindelka<sup>575</sup><sub>No. 16</sub> has produced very favorable results with glycerine enemata in 100 horses, 5 gram. (77 minims) always producing an evacuation. While believing that suppositories have a decided advantage over enemata, Dietrich<sup>575</sup><sub>No. 37</sub> considers those recommended by Boas to have the disadvantages of being too large and of inserting into the rectum too great a proportion of comparatively inert matter. He therefore describes and offers for sale a suppository composed of 90 parts of glycerine and 10 parts of a hard stearine soap, and says that, according to reports from various physicians who have tried them in numerous cases, they produce a natural, easy, and prompt action, the bowels being opened within ten minutes. Novotny<sup>6</sup><sub>v. 1, p. 344</sub> has administered enemata of ½ to 1 fluidrachm (1.94 to 3.89 gram.) of glycerine to 200 patients with the most diverse diseases, and in all but 3 or 4 a good stool was produced within a few minutes, though in a few cases 2 to 3 hours elapsed. There was not a disagreeable symptom in a single instance. In about a third of the cases a second liquid stool followed the first formed one. He has had cases of obstinate constipation yield almost immediately to this treatment, after having withstood the most powerful purgatives. Subbotic<sup>317</sup><sub>No. 37</sub> after numerous trials of glycerine by enema, confirms the favorable opinion of others. It was always promptly efficient if the rectum contained fæces. When, on the other hand, the rectum was empty, repeated injections failed to induce a passage. He considers that this is

entirely in accord with Anacker's explanation, and is a proof that the action of glycerine is confined to the lowest section of the bowel, and that it is unable to stimulate the upper portions to propel the fæces downward. Reisinger<sup>88</sup> reports his experience with 115 rectal injections of glycerine, 101 of which were successful, usually in 2 to 15 minutes, though the evacuation was sometimes delayed for 1 to 2 hours. The cases were of the most different diseases. The stools varied from the consistence of diarrhœa to quite decided solidity. The only unpleasant secondary effects noted were the complaints of slight burning in the anus in 2 cases. Post-mortem examinations were later made on 5 of the cases, but in every instance the mucous membrane of the rectum was found to be destitute of any change which could have been produced by the injections. As regards the manner in which glycerine provokes the evacuations, it is evident that it is not through a mechanical irritation, since the injection of an indifferent chemical substance (solution of albumen) had no effect at all. Neither does the author share the views of Anacker, since he found that concentrated solutions of sulphate of sodium introduced into the rectum had no such effect as the glycerine, though they have the power of abstracting water. It is more probable, therefore, that there exists a direct chemical action of the glycerine on the mucous membrane of the rectum. Ullmann<sup>100</sup> has made a careful critical study of the effect of glycerine enemata, and the relation of the successful administrations to the disease, the habits of the patients, etc. In the great majority of 174 cases the stools were hard, and in only 7 were they watery. Subsequent constipation was seen in about  $\frac{1}{3}$  of the patients. Diarrhœa followed in 6 patients, all of them suffering from tuberculosis. A slight burning in the anus was not infrequent after defæcation, but pain of any moment only occurred in 5 patients. Like Subbotic, he noted the almost invariable failure of the glycerine in cases in which the rectum was empty and the fæces were contained in the bowel above it, and with him believes that the inverse of peristalsis is limited to the lower section of the large intestine. He agrees with Unger that the evacuation is due to a profuse hypersecretion produced by the glycerine. He recommends the injections when it is desired to empty the rectum quickly or when general peristalsis is to be avoided. Their habitual use is improper, as there may be danger of causing



inflammation. The amount used was 3 to 6 gram. (46 to 92 minims) and the evacuation generally followed in 3 to 15 minutes. From England comes the report of a trial of glycerine by J. Althaus,<sup>2</sup><sub>v.1,p.40</sub> who announces his success with it in a large number of his own cases, while several other physicians have told him of their satisfaction with the plan of treatment. The evacuation of the bowels takes place almost immediately or within a few minutes, and there is no pain or discomfort, unless it be a little throbbing felt in the rectum for a few moments afterward. M. Prowse,<sup>2</sup><sub>v.1,p.40</sub> states that glycerine is quite effectual when diluted with an equal quantity of water. W. Easby,<sup>2</sup><sub>v.1,p.40</sub> cannot speak too highly of it as a laxative enema, having used it frequently of late, though his first trial of it was about two years ago. He gives one fluidrachm (3.89 gram.) with a little water in a syringe holding about half an ounce. C. J. R. MacLean,<sup>2</sup><sub>v.1,p.40</sub> has employed it by enema in a number of cases with very satisfactory results, using a common glass urethral syringe. J. Bunting,<sup>2</sup><sub>v.1,p.40</sub> does not find glycerine diluted with water act nearly so well as when pure. C. Palmer,<sup>2</sup><sub>v.1,p.40</sub> administers it with a syringe in the shape of a small India-rubber ball with a vulcanite nozzle. W. B. Roué,<sup>2</sup><sub>v.1,p.121</sub> describes, with an illustration, a small graduated glass syringe, holding 3 drachms (11.7 gram.) and adapted for glycerine enemata. The vulcanite nozzle is two inches long and of sufficiently large bore to admit the easy entrance and exit of the glycerine. G. A. Carpenter,<sup>6</sup><sub>v.2,p.305</sub> tabulates the results of 214 injections of 1 to 2 drachms (3.89 to 7.77 gram.) of glycerine in 63 children of from 1 to 11 years of age. The method was uniformly successful, and in no case did it invariably fail. The enemata are easy of application, prompt in action, and unattended by the slightest discomfort. He considers them superior to the drugs ordinarily employed for constipation. An American report on the rectal use of glycerine as a laxative is that of E. R. Mayer,<sup>9</sup><sub>v.1,p.200</sub> who has employed enemata of  $\frac{1}{2}$  drachm (1.94 gram.) with very general success, and has also used the drug in hollow suppositories of cacao-butter, or inclosed in gelatine capsules. A slight degree of rectal irritation followed the repeated use of the capsules. In a case of painful hæmorrhoids enemata of glycerine not only emptied the bowels more thoroughly than compound licorice powder had done, but appeared to give more relief to the pain

than all the local treatment previously employed. The author then reports an interesting case of extreme tympanites in peritonitis unrelieved by injections of soap, water, and turpentine, in which 2 fluidounces (62.2 gram.) of glycerine introduced high into the rectum gave great relief by the discharge of a large amount of flatus within 20 minutes, followed later by a faecal evacuation. Contrary to the views of Subbotic, he believes that glycerine has a local action not only on the lower bowel, but that by its peculiar power of diffusing itself it rapidly spreads past the sigmoid flexure to some of the coils of the small intestine. In this way a large amount of fluid is mingled with the faeces, and finally a general peristalsis is produced. I. N. Love,<sup>61</sup> also, has used glycerine enemata in many cases, and with uniformly satisfactory results, finding it particularly useful in infants and mothers in whom a constipated habit has persisted after the birth of the child. By giving the injection at the same hour every day the unaided regularity of the bowels may be brought about. In a few cases of hæmorrhoids and of severe rectal irritation he had better results with glycerine than with the purgatives and sedative ointments previously used. I have myself<sup>9</sup> reported 234 cases of constipation, occurring in the most varied medical and surgical diseases, in which over 530 rectal administrations of glycerine were given. When enemata were employed the amount used was usually 1 to 2 fluidrachms (3.89 to 7.77 gram.), though 1 fluidrachm (3.89 gram.) was generally found sufficient. This was sometimes injected pure, sometimes mixed with a small quantity of water, the effect being much the same in either case. In some instances 20 minims (1.5 gram.) of glycerine were inclosed in a gelatine capsule and inserted into the rectum, and answered well in many cases. By far the greatest success with suppositories, however, was obtained with those made with glycerine and soap. The results of the glycerine treatment were most encouraging, as there nearly always followed a full, easy, and painless movement within a few minutes after its employment. The average time required after the enemata was probably 5 to 10 minutes, though the effect was sometimes not evident for 15 to 30 minutes, and in one case was delayed 1½ hours. Very frequently the evacuation was almost immediate. In a case of convalescent typhoid fever, for example, whose constipation, lasting 3½ days, had not been relieved by

an injection of warm water, an enema of 1 drachm (3.89 gram.) of glycerine produced such an immediate effect that the nurse had hardly turned away from the bed before the patient called for the bed-pan. The thought naturally arises that such prompt results must certainly be due to a strongly irritating action on the mucous membrane of the intestine. I would, however, call particular attention to the fact that this does not appear to be the case. My experience agrees with that of the writers already quoted, that it is rare that pain in the abdomen or rectum, or other symptom of real irritation, precedes the evacuation or remains after it, as is so often the case after stimulating aqueous enemata have been used. In a few cases I have recorded a stinging in the rectum attending the injection, or a burning sensation, lasting a few minutes after the bowels were opened. It was found that this did not occur if the glycerine was mixed with a small quantity of water. In a few other instances there was actual rectal pain, due not so much to the action of the glycerine as to the passage of not sufficiently softened fæces. All that has been said regarding enemata of glycerine applies as well to the effects of suppositories, except that the latter require somewhat longer to operate, owing to the time needed for their solution in the bowel. They are also somewhat less certain in their action, on account of the medicament contained in them. Glycerine usually produces but one stool, and this is soft rather than liquid. It is for this reason that the remedy sometimes fails in obstinate constipation, the very hard scybalous masses not being softened enough. Yet I am by no means certain that, even in most cases of this kind, soap and water have, as a rule, any superiority, for both the enemata and suppositories of glycerine were often found useful in the enforced constipation following gynæcological operations, such as perineorrhaphy, where it was desired that the fæces should be soft, and that straining should be avoided. There were instances, too, and that not infrequently, in which glycerine produced an easy passage, but in which soap and water either effected no movement at all, or did not soften the scybala sufficiently to prevent painful evacuations. This method of treatment was found particularly valuable in cases in which opium in large doses had been administered during quite a considerable period. It failed in no such instance, though turpentine with soap and water was very often found to be ineffectual. The drug did

not appear to lose its effect on continued use, it was not found necessary to increase the dose, neither did there seem to be any tendency to constipation remaining after the treatment was discontinued. Glycerine is not, of course, an infallible remedy, and, like all other aperients, will sometimes fail utterly, even in cases in which it has been at other times effectual. My experience with it has, however, been sufficiently extended to justify the conclusion that it is a safe, prompt, and reliable means of obtaining an evacuation of the bowels, more convenient of employment and more pleasant to the patient than are large aqueous injections, and certainly superior to them as regards the absence of irritation of the rectum. Finally, I would again call attention to the administration of the drug in the glycerine and soap suppositories referred to, as an elegant means of exhibiting the remedy in private practice. They were modeled after those described by Dieterich, weighed 52 grains (3.37 gram.) each, and contained 90 per cent. of glycerine. One of these was usually found effectual. A size for babies, holding 10 or more minims (0.65 gram.), also proved to be of service. Though glycerine suppositories are somewhat less certain than are the enemata, yet they are not only much more convenient for private practice, but, owing to their rather slower action, I found them entirely unproductive of discomfort, even in the occasional instances in which the enemata cause slight burning. The largest rectal gelatine capsules hold not more than 25 minims (1.62 gram.), an amount too small to be generally useful. Their action is uncertain, and even when 2 are given at a time a movement does not occur for 30 to 40 minutes. Another objection is that, if sold already filled, they rapidly soften and allow the glycerine to escape. The hollow cacao-butter suppositories are not to be recommended on account of the size required to hold a sufficient quantity of glycerine and the large amount of inert matter employed. I cannot, therefore, but consider the glycerine and soap suppositories as the most eligible form. They are very hygroscopic, but if wrapped in tin-foil keep very well.

*Guaiac.*—Armstrong <sup>202</sup><sub>Dec. 28, '97</sub> reports his experience with the fluid extract of guaiac in the treatment of 16 cases of scarlatina. He often combined it with aconite, gave it frequently in small doses, and says that it has not disappointed him in a single instance.

*Helleborus Viridis* (*Helleborein*).—Venturini and Gasparini<sup>67, 80</sup> state that 3 to 4 drops of a solution of helleborein, each containing  $\frac{1}{200}$  of a grain (0.0003 gram.), dropped into the eye will produce complete corneal anæsthesia without any irritation. The anæsthetic action lasts half an hour or a little longer, but when the drug is combined with cocaine the effect disappears so rapidly that there is time for no operation whatever. Its hypodermic injection has a local action, but is to be avoided on account of the drug's powerful influence on the heart. Christovich<sup>456, 41</sup> July, '97; Jan. '98 tried the action of the aqueous extract of *helleborus viridis* in 11 cases of cardiac disease, and found it to increase the strength of the heart's action and the fullness of the pulse, while it lessened its excessive rapidity when this was present. Congestions of the lungs, liver, and kidneys were cured or improved, the secretion of urine increased, and serous transudations removed. The existence of a complicating nephritis interfered considerably with the action of the drug. The dose was 10 to 20 drops of a 1 per cent. solution of the aqueous extract 4 to 6 times a day.

*Hydrargyrum* (*Mercury*).—The chief points of interest concerning mercury as found in the journals of the year relate to its employment as a diuretic and to its administration by the hypodermic method, particularly in the treatment of syphilis. Considering now in order the different preparations of mercury, we find that the *metal itself* is recommended by S. C. Griffith,<sup>2</sup> for the treatment of syphilis, after a successful experience of more than 10 years with it. He uses only very small doses, giving  $\frac{1}{4}$  of a grain (0.011 gram.) of *hydrargyrum cum creta* three times a day for a month or longer, with any tonic or other medicine that may be indicated. After this time he reduces the dose to twice in the day for 3 months or longer, and then the medicine is given once a day for a considerable time. Should the symptoms be rebellious after the third or fourth month, he uses in addition 5 to 10 minims (0.32 to 0.65 gram.) of the *liquor hydrargyri perchloridi* twice daily. In this way mercury can be given for an indefinite length of time and every trace of syphilis swept away, and it will be found that when all the primary symptoms have disappeared no tertiary will follow. Lang,<sup>41</sup> too, prefers the injection of the metal itself to all other forms of it in the treatment of syphilis. He gives it hypodermically, mixing intimately 3 parts of it with 3 of lanoline

and 4 of olive-oil. Of this substance, which he names "gray oil," he injects 3 c.cm. (48 grains) in two places on the back or nates every 5 to 8 days, giving one-half of the injection in each spot. After 2 to 3 weeks a pause of 10 to 20 days is made in the treatment, and the injections are then resumed, though at longer intervals. The method is superior to the hypodermic employment of corrosive sublimate, because a very much larger amount of mercury can be given at one time. Abscess occurs very rarely and pain is not great. J. Trost<sup>84</sup><sub>Oct. 12</sub> made some careful comparative tests of gray oil with calomel-oil, used hypodermically for this disease, and prefers the former, since with the latter the pain was more intense and the infiltration greater. The injections were given simultaneously, the calomel preparation on one side of the back and that of metallic mercury on the other. A similar comparison taught him that the calomel-oil was to be preferred to the calomel-suspension of Neisser. Bender,<sup>169</sup><sub>Mar.</sub> on the other hand, describes his success with injections of calomel-oil in syphilis as brilliant, and considers it superior to the gray oil of Lang. In 114 injections given to 26 patients he has seen stomatitis 7 times, but no case of abscess. The gray oil was injected 115 times into 12 patients; 4 times there was stomatitis, once an abscess, and infiltration of the tissues after nearly every injection. Among further reports on the employment of *calomel* hypodermically may be noted that of L. Hoffmann,<sup>28</sup><sub>Feb.</sub> who treated 16 patients with 96 injections of the drug, probably suspended in oil. Abscess appeared in 5 instances, stomatitis was frequent in spite of the greatest attention to the mouth, mercurial dysentery was observed 8 times, and fever lasting 2 to 3 days was of common occurrence. Although, therefore, the results of treatment in syphilitic affections were excellent, the unpleasant secondary effects often contra-indicate this method of medication. E. Wilander,<sup>109</sup><sub>Feb.</sub> on the contrary, writes strongly in favor of the treatment of syphilis by hypodermic injections of calomel or other insoluble mercurial preparations, deeming the method both simple and efficient, and very powerful. He saw abscesses or infiltration follow the use of calomel in but few cases, while they did not occur at all after the injection of the oxide of mercury, though there was a very great deal of pain after the latter drug. Scarenzio<sup>214</sup><sub>Feb.</sub> claims a special efficacy for the calomel injections in the

tertiary stages of syphilis, though they are applicable in all forms. A dose of 4 to 5 grains (0.26 to 0.32 gram.) is sufficient to cause all symptoms to abate. It should be mixed with glycerine and all large particles excluded, and the patient should remain in bed for 2 to 3 days. The propriety of using calomel at all was discussed extensively in one of the medical journals of the United States,<sup>85</sup> C. F. Paine regarding calomel as one of the most efficient laxatives, and finding it serviceable in cholera morbus, cholera infantum, catarrhal states of the intestines, and in croup; O. C. Buster saying that no medicine has given him better results in the treatment of gastric irritation, malarial attacks with frequent emesis, and various other conditions, and J. M. Isbel claiming that it is useful at the beginning of nearly every febrile condition, in derangements of the liver, and especially in the intestinal disorders of children. On the other hand, J. W. Pickel considers that great caution should always be used in giving it to the aged and feeble, and that it is very harmful in typho-malarial fevers, since it is, in his experience, nearly always followed by diarrhoea and tympanites. C. H. Wilkinson claims that his success in malarial disorders is just as good as formerly, though he gives less and less of the drug every year, and C. M. Ramsdell believes that physicians in his part of the country [Texas] would lose fewer patients if they were compelled to discard the internal use of mercurials altogether. Calomel is recommended by Drzewiecki,<sup>50</sup> for the prevention of small-pox scars. He has used it with great success, after having tried all other possible means without good results. Spread over the face in the form of powder, it causes the papules and pustules to dry up very quickly, and thus prevents their leaving marks. J. Corbin,<sup>1</sup> treats diphtheria by mercurial fumigations, volatilizing for a child of 8 to 10 years 40 to 60 grains (2.59 to 3.89 gram.) of calomel under a suitable tent or canopy, and keeping it over the child 20 minutes. This procedure is repeated every 2 to 3 hours during the first day, at the end of which time he expects to find the cough loosened. The process is continued at the rate of 2 to 3 times a day for a week if the cough tightens again. The lamp should be powerful enough to volatilize rapidly, so that the temperature under the canopy may not be unpleasantly elevated. G. B. Fowler<sup>80</sup> joins in this favorable estimation of calomel in diphtheria, believing it to be the best remedy we possess for promoting absorp-

tion, and as a safe and efficient germicide. He has now treated 30 children by this method, and has lost but 2 cases. As much as 1 grain (0.06 gram.) every hour has been given for several hours, and with no unfavorable results, except in one instance where there was vomiting and a rise of temperature, which the author believes was an instance of mercurial fever. Salivation did not occur, and there was no severe diarrhœa. He recommends it for diarrhœa of children in doses of  $\frac{1}{6}$  of a grain (0.01 gram.) combined with bicarbonate of soda, and repeated every half hour until  $\frac{1}{2}$  to 1 grain (0.03 to 0.06 gram.) is taken. After the bowels have been moved several times as a result of the medicine, it may be necessary to give small doses of Dover's powder. He believes the remedy to act as a cathartic and as an antiseptic. For all the slight derangements of digestion in which diarrhœa may alternate with constipation calomel in minute doses twice a week has proved quite satisfactory. The frequency of the dose may be gradually reduced, and after about three weeks it may be stopped altogether. For intestinal worms the author uses no other treatment. R. Stintzing<sup>34</sup> tested the diuretic action of calomel in 25 cases. In hepatogenous and renal dropsies, and in that from exudative processes the drug was useless, but in 12 out of 16 cases of severe heart-disease its effects were excellent. The dose was that proposed by Jendræssik, 0.2 gram. (3 grains) three times a day, and was combined with small amounts of opium to prevent diarrhœa. A chlorate of potash gargle was given at the same time to prevent stomatitis. The treatment must be continued at least 3 days. The increased diuresis began usually in 2 to 4 days, and lasted 4 to 5 days, as a rule. The drug can be advantageously combined with digitalis or other heart tonics. The author believes that it acts directly on the secreting epithelium of the kidneys. T. Jones<sup>2</sup> reports a case of cirrhosis of the liver with ascites in which calomel seemed to have a practically curative effect. Three grains (0.19 gram.) were given t. d. until 5 doses were taken. Diuresis began on the second day and lasted for 5 days. Twelve days later a second course of the drug was given during 5 days, and at the end of 25 days dropsy had disappeared. Silva<sup>319</sup> <sup>90</sup> <sub>No. 19, Oct.</sub> says that this diuretic action in heart-disease is most marked in the cases with extensive œdema. Here it acts by dilatation of the renal vessels and the consequent increased supply of blood. The drug fails to



cause diuresis in febrile diseases because the renal vessels are already dilated. W. Bieganski<sup>326 19</sup><sub>Sept.; Oct. 27</sub> reports his experience with calomel as a diuretic, and concludes that the best results from mercury are seen in œdema resulting from cardiac failure. Diseases of the kidneys limit or entirely abolish the diuretic action. It is important that full doses be given, as small amounts are not diuretic. For the first 2 days the secretion of urine is diminished, but afterward it is augmented. He considers the action of the drug to be due to the irritation which it produces while passing through the kidneys. The employment of calomel to produce diuresis has continued to engage the attention of physicians during the year. G. B. Fowler<sup>80</sup><sub>Jan.</sub> found it serviceable as a diuretic in pleurisy, and has given it successfully with the same object in pneumonias where there was danger from œdema or accumulation of mucus. W. E. Ignatjew<sup>21</sup><sub>Nov. 4</sub> tried it in 48 patients with dropsy from different causes, giving 2 to 3 grains (0.13 to 0.19 gram.) 3 to 4 times in 24 hours, and continuing its administration 2 to 4 days. Opium was sometimes combined with it, and a mouth-wash of chlorate of potash was ordered from the beginning of the treatment. He finds it often a powerful diuretic, but without effect in pleural effusion and in dropsy due to renal or hepatic diseases. Schwass<sup>4</sup><sub>Nov. 20</sub>, <sup>9</sup><sub>Oct. 27</sub> has used calomel and digitalis in the dropsy of hepatic cirrhosis with exceedingly fortunate results. One and a half grains (0.097 gram.) of the former and  $\frac{3}{4}$  grain (0.048 gram.) of the latter were given every 3 hours for a week. Combined with digitalis he thinks that the mercurial is borne better and for a longer period. H. Nothnagel<sup>116</sup><sub>May</sub>, <sup>5</sup><sub>Aug.</sub> considers it a very valuable diuretic in the dropsy of heart-disease, but useless in that depending on renal or hepatic affections. He gives 2½ grains (0.16 gram.) 4 times a day until 10 doses are taken. The increase in the secretion of urine does not appear until the third or fourth day. Should no result follow in 4 days the treatment is stopped, to be recommenced after 8 days. If successful on the first trial a second course of 10 doses is carried out after 2 to 4 weeks. P. Terray<sup>17</sup><sub>July 24</sub> says that the diuretic action of calomel commences on or about the fourth day after the treatment is begun. The degree of this is dependent on the amount of hydrops and not on the quantity of the drug ingested. Stomatitis and diarrhœa are very liable to be produced, and in several cases of nephritis and hepa-

titis respectively no diuresis followed the use of the drug. It will be seen from the abstracts given that the majority of those who have used calomel to induce diuresis have reported in its favor, though the most general opinion is that it is of value only or chiefly in the dropsy of heart-disease. My own experience with it in dropsy has not been very satisfactory. Though tried repeatedly, a marked diuretic action was obtained in no instance, and salivation is very easily produced by it. The weight of authority in its favor, however, renders it advisable to try a course of calomel whenever other diuretics have failed to give relief. Favorable results with the *bichloride of mercury* are published by E. Rondot,<sup>99 Feb. 25</sup> who reports 23 severe cases of typhoid fever treated by frequent small doses, the daily quantity not exceeding 5 milligrams ( $\frac{1}{8}$  grain). Twenty-one of the cases recovered, and in these there was witnessed a decided shortening of the term of the disease and a diminution of the severity of the symptoms. There was neither salivation, diarrhœa, nor debility in any case. The author believes that the mercury does good by attacking the microbes in the blood, and recommends that to kill those in the alimentary canal some microbicide be used which is almost insoluble, like naphthol. H. N. Vineberg,<sup>1 Jan. 25</sup> reports several cases of the use of the bichloride of mercury in pelvic inflammations, and concludes that this drug, internally administered, is a valuable aid to local treatment, while in some cases where the inflammatory products are deeply situated within the pelvis it is thus more efficacious in promoting absorption than the most approved topical therapeutics. The drug may be given for several weeks without any untoward effect. H. Michaelis,<sup>58 Aug. 25</sup> advises that sublimate solutions be kept in brownish-yellow bottles, in order to prevent the decomposition which ordinary light gradually produces. LaPlace,<sup>100 July 2</sup> recommends the mixture of tartaric acid with sublimate in the proportion of  $\frac{1}{4}$  to 1 in 1000 parts of water, or as much as may be desired. This renders the mercury much more quickly soluble. Various other mercurial preparations have received more or less attention from contributors to the journals. R. de Lucca,<sup>589 Mar. 22; 231 May</sup> describes the method of preparation of the *alaninate* of mercury, which he has used in the treatment of syphilis, giving it both internally and by injection. Twenty cases were treated by the latter method, the average daily dose being 0.005 to 0.01 gram. ( $\frac{1}{8}$  grain), the average duration of the

treatment 37.05 days, and the average number of injections 27.7. Only 3 times did suppuration occur at the site of injection, and in no case did stomatitis appear. The alaninate appears to give more permanent relief than the other mercurial preparations, and a smaller dose is required than with the bichloride. The author has also administered it internally in 20 cases, and considers that it gives especially happy results in syphilis in children. The drug is easily tolerated and produced stomatitis in no case. J. A. Bloxam<sup>6</sup>, recommends hypodermic use of sal alemproth for syphilis, made by dissolving 32 grains (2.15 gram.) of the *perchloride of mercury* and 16 grains (1.07 gram.) of chloride of ammonia in enough water to make 2 fluidounces (62.2 gram.). Ten minims (0.647 gram.) of this equals  $\frac{1}{8}$  grain (0.02 gram.) of the salt, and should be deeply injected into the muscles of the buttock once in 7 days for 7 to 8 weeks, then every 2 weeks, and later once a month, and the treatment persisted in for 12 to 18 months. The author has used this method upward of 900 times, and with but little or no pain and no production of abscess. Chibret<sup>3</sup>, July 18, concludes from his bacteriological experiments and clinical trials that *oxycyanide of mercury* in a solution of 1 in 1500 produces antiseptis as well as the bichloride does, and with better tolerance by the tissues and less danger of absorption. H. Selldén<sup>113</sup>, Apr. 9, reports the very great success which he has obtained with cyanide of mercury in diphtheria. In the hands of colleagues and of himself 1400 cases have been treated with it, and with a death-rate of only 4.9 per cent. He gives a teaspoonful of a 1 in 10,000 solution every  $\frac{1}{4}$  to 1 hour, according to the age of the child. J. Roussel<sup>24</sup>, Nov. 25, also recommends the cyanide in 1 to 2 solution for hypodermic use, on the ground that the pain which it produces is insignificant. In this respect it is superior to the peptonate. He is strongly opposed to the hypodermic injection of the insoluble preparations of mercury. F. P. Henry<sup>9</sup>, Nov. 1, says that a hypodermic injection of corrosive sublimate is so painful that few will consent to its repetition. He has, therefore, used the bicyanide, having given about 200 injections of it in erysipelas and syphilis. He makes a mixture as follows: Hydrarg. bicyanid., 2 gr. (0.13 gram.); cocain. hydrochlorat., 4 gr. (0.26 gram.); aquæ destillat.,  $\frac{1}{2}$  oz. (1.94 gram.). The dose of this is 15 minims (0.97 gram.), equaling  $\frac{1}{8}$  gr. This injection is comparatively painless, and he has never seen any untoward consti-

tutional symptoms follow it. He has treated 10 cases of erysipelas capitis by making injections at least  $\frac{1}{2}$  inch beyond the border of the advancing inflammation, and is convinced that if the treatment is begun within the first 48 hours the disease may sometimes be aborted. Abscess is frequently produced by the injection. Nourry<sup>67</sup><sub>Apr. 30; June 9</sub> recommends the *iodotannate* of mercury as an easily soluble salt for hypodermic injection in the treatment of syphilis. Its combination is: Hydrargyri, gr.  $\frac{1}{4}$  (0.008 gram.); iodini, gr.  $\frac{9}{20}$  (0.03 gram.); acid. ratanhiaë-tannici, gr.  $\frac{3}{8}$  (0.039 gram.); glycerini, m. 15 (0.97 gram.). The injection is not followed by pain, abscess, or induration. Not more than 7 minims (0.45 gram.) of the solution should be injected at one time, as absorption is very rapid, and salivation and violent gastric disturbances may occur. Krassowski<sup>154</sup><sub>Jan. 1; Feb. 4</sub> reports 11 laparotomies in which equal parts of the *biniodide* of mercury and of iodide of potash were used as an antiseptic dressing. He concludes that the solution of 1 in 4000 of the mercurial salt is an effectual dressing and less irritating than the bichloride, since a 5 per cent. solution can be applied to the skin without producing irritation. R. Kenner<sup>59</sup><sub>Nov. 10</sub> has for the last 6 years used the ointment of the *nitrate* of mercury as an abortifacient of boils and felons, and claims that with it he has aborted nearly all cases under his care in which suppuration had not commenced. The application is painless, and in about 12 hours there is a peculiar drawing sensation, after which all uneasiness ceases. In treating felons the entire finger should be covered with the coating of the ointment about  $\frac{1}{8}$  of an inch thick, and then wrapped with a piece of thick adhesive plaster. The dressing should remain 24 hours, after which no further treatment is necessary. H. T. Inge<sup>207</sup><sub>June 2</sub> considers the *salicylate* of mercury superior to the bichloride in that it is easily borne by the stomach, does not produce salivation, has decided curative effects when applied to mucous patches and syphiloderms, and is a superior antiseptic. It may be given internally in doses of  $\frac{1}{10}$  grain (0.006 gram.) and upward. In the general treatment of syphilis, however, it is, in his opinion, by no means equal to the bichloride. Aranjo<sup>25</sup><sub>June 2</sub> gives the salicylate hypodermically or by the mouth in doses of  $\frac{1}{2}$  grain (0.03 gram.) in the treatment of syphilis. It is well borne by the stomach, and never gives rise to stomatitis. It acts more promptly and energetically in syphilis than any other

preparation of mercury. It has also been used successfully as a urethral injection and in syphilitic affections of the eye. Szadek,<sup>28</sup><sub>No. 10, July 28</sub><sup>1</sup> also, claims that this salt is an excellent preparation, causing not the slightest local disturbance when given either by the mouth or hypodermically. It is useful as a local application in syphilitic infiltrations and ulcerations, and acts well in urethritis. Epstein,<sup>34</sup><sub>Aug. 11</sub> too, recommends it hypodermically in syphilitic affections, having used it suspended in olive-oil in the proportion of 1 in 10. He has seen no induration or stomatitis and but very little pain follows the procedure. Vollert<sup>116</sup><sub>Sept.</sub> has tried the *succinimide* of mercury for hypodermic injection 523 times in 28 patients. It is freely soluble in water, and the solution is stable and does not precipitate albumen. When properly applied the injection rarely if ever sets up suppuration. The needle should be run obliquely and deeply into the subcutaneous fat of the buttock, and the liquid injected slowly, and by stroking with the finger dispersed over a somewhat extended area. The daily injections are made alternately into the right and left buttock, and 10 c.cm. (32.45 grains) of a 2 per cent. solution used. The average number of injections given to each syphilitic patient was about 19, though in severe cases 30 to 35 were required. Some instances are reported of the *deleterious action* of mercury in addition to those already referred to. G. T. McKeough,<sup>257</sup><sub>v. 20, p. 225</sub> reports a case of mercurial poisoning from the application of vaginal tampons wet with a solution of about 1 in 1200 of corrosive sublimate in a case of flooding during pregnancy. Virchow<sup>4</sup><sub>No. 30, 77</sub> exhibited before the Medical Society of Berlin the intestines of three persons in which dysenteric changes had been produced by the employment of sublimate, and Kraus<sup>69</sup><sub>No. 22</sub> reports an instance of this, in which after the second hypodermic injection of 0.1 gram. (1.5 grains) of calomel, intense dysentery with perforating ulceration appeared, accompanied by anuria. Fränkel, too,<sup>69</sup><sub>p. 128</sub><sup>5</sup><sub>Aug.</sub> calls renewed attention to the fact that the external use of the bichloride of mercury in the treatment of wounds may produce a severe diphtheritic inflammation of the intestine, especially in debilitated individuals. Absorption is most apt to take place from the peritoneum or the inner surface of the uterus after parturition. The inflammation attacks the large intestine, and only exceptionally the ileum also. He states further that other forms of mercury, as well as the bichloride, are capable of

producing the affection. Audry <sup>211</sup><sub>Apr. 15</sub> exhibited the anatomical specimens from a patient who had received hypodermic injections of metallic mercury. The intestine was dotted with numerous ulcers and diphtheroid thickenings, and the kidneys were of the small white type.

*Hydrastis Canadensis*.—Schatz <sup>57</sup><sub>No. 26</sub> <sup>80</sup><sub>Sept.</sub> speaks in the highest terms of the value of *hydrastis canadensis* in controlling hyperæmia and chronic inflammation of the internal genitals. The hæmorrhages of uterine myomata are reduced and regulated by it. Givopiszew <sup>67</sup><sub>No. 8</sub> <sup>80</sup><sub>July</sub> concludes from his clinical experiments that the drug is an excellent remedy in uterine hæmorrhage occurring at the menopause or menstrual period, as well as that due to inflammation or displacements. The uterine contractions are less intense than after ergot. No unpleasant symptoms were at any time observed. Hach <sup>1201</sup><sub>1887</sub> <sup>89</sup><sub>Jan.</sub> has administered it to 97 cases of uterine hæmorrhage from various causes, with complete or partial success in 47 of them. He recommends the drug in preventing flooding of any kind. He never observed any untoward effects, except some palpitation in a woman after taking 30 drops of the fluid extract. Von Styrk, <sup>1201</sup><sub>1887</sub> <sup>89</sup> however, saw a woman in the fourth month of pregnancy in whom abortion took place on the third day of treatment with 100 drops of the tincture daily, given for severe cervical catarrh. Hübner <sup>1201</sup><sub>1887</sub> <sup>89</sup><sub>Jan.</sub> reports satisfactory results in 3 cases of uterine fibroids. Krannhals <sup>1201</sup><sub>1887</sub> <sup>89</sup><sub>Jan.</sub> found it useless in the hæmoptysis of phthisis, and Hampeln <sup>1201</sup><sub>1887</sub> <sup>89</sup><sub>Jan.</sub> observed no good from it in nephrorrhagia. J. M. Fuchs, <sup>22</sup><sub>Jan. 26</sub> used 20 minims (1.30 gram.) of the fluid extract 4 times daily for menorrhagia in a case of uterine fibroids. The bleeding was completely arrested, and in 3 months' time the patient menstruated regularly.

*Hydrogen Peroxide*.—(See *Oxygen*.)

*Hyoscyamus*—*Hyoscine*—*Hyoscyamine*.—The value of hyoscine as a hypnotic has been tested to a considerable extent during the past year. J. J. Pitcairn <sup>2</sup><sub>July 14</sub> reports a case of mania, one of delirium tremens, and one of simple insomnia, in which sleep was promptly produced by the drug. He considers it a very certain hypnotic, only contra-indicated in pulmonary diseases. Bruce <sup>5</sup><sub>ca</sub> has found it most reliable as a brain sedative, especially valuable in delirium tremens. Kraus <sup>559</sup><sub>No. 16</sub> has used hypodermic injections of the muriate of hyoscine in 90 cases of insanity. Sleep

came in 6 to 15 minutes, sometimes preceded by a condition like drunkenness, lasting, however, but a short time. The effect of the drug does not appear so soon in paralytics as in maniacal patients. It has no influence on pulse or respiration. The dose employed was 0.001 gram. ( $\frac{1}{80}$  grain), and no bad results were at any time seen, except vomiting in one instance. Kny<sup>34</sup> gave 3000 single doses of hyoscyne internally to 88 patients with different varieties of mental disease. In 82.2 per cent. the hypnotic effect was very satisfactory. The author has never seen any ill effects except occasional dryness of the mouth and thirst. The first dose should be 0.0005 to 0.001 gram. ( $\frac{1}{200}$  to  $\frac{1}{80}$  grain), to be later increased as habituation occurs. E. Konrad<sup>35</sup> has used several hundred injections in different mental disorders, and concludes that in conditions of excitement of a chronic form hyoscyne is at times useful in doses of 0.0005 to 0.001 gram. ( $\frac{1}{200}$  to  $\frac{1}{80}$  grain), but that it must not be given continuously for more than 2 to 3 days. In acute curable psychoses it is to be avoided as long as other remedies have any effect; and, if exhaustion of the strength is feared, the drug should be given at long intervals only. In affections of the heart it is never to be used. J. Salgó<sup>34</sup> has given several hundred hypodermic injections of a 2 per cent. solution of the hydrochlorate of hyoscyne, and concludes that for states of excitement and exaltation occurring in any psychosis whatever the drug surpasses all others. Its action is prompt and more certain than that of morphia, chloral, and paraldehyde. It is not a true hypnotic, since when given in acute mania it leaves the patient always awake, though it appears to make him exceedingly sleepy. Fischer<sup>6</sup> has found the hydrochlorate, given hypodermically in doses of  $\frac{1}{2}$ , rarely  $1\frac{1}{2}$ , milligram. ( $\frac{1}{200}$  to  $\frac{1}{40}$  grain) very useful in maniacal fury, paralytic excitability, and the extreme restlessness of the melancholic. It was also successful in insomnia when chloral and morphia had failed. G. Thompson<sup>6</sup>, having given  $\frac{1}{100}$  to  $\frac{1}{200}$  grain (0.00648 to 0.01396 gram.) to a number of cases, believes it to be a very certain hypnotic, especially serviceable in chronic mania. An overdose is liable to produce toxic symptoms. In no case did it fail to produce the desired effect when given in proper dose. W. H. Githens<sup>15</sup> reports a case of recovery after the ingestion of  $\frac{1}{4}$  of a grain (0.05 gram.) of the hydrobromate of hyoscyne.

Profound sleep was the only symptom recorded. Buddee<sup>69</sup><sub>May 17</sub><sup>19</sup><sub>July 7</sub> found that hyoscine was more active than hyoscyamine. He employed the iodide in doses of 0.0001 gram. ( $\frac{1}{80}$  grain) for children, and 0.0002 gram. ( $\frac{1}{40}$  grain) for adults. It appeared to be useless in chorea, athetosis, and whooping-cough, and to have but a weak hypnotic action in tabes. Its effects were most prompt in paralysis agitans and in senile and alcoholic tremor, but its influence is not lasting. Partial results were obtained in the night-sweats of phthisis and in lead colic. It always produces a sense of fatigue, and flashes of light, dizziness, dryness of the throat, dilatation of the pupil, and delirium are apt to occur. Tolerance of the drug is acquired if it be given for a considerable time. As regards *hyoscyamine*, J. A. West<sup>2</sup><sub>Sept. 22</sub> found excessive dryness of the throat, prostration, and insomnia lasting through the whole night, after the ingestion of  $\frac{1}{40}$  grain (0.0016 gram.), and W. S. Thomson<sup>2</sup><sub>Aug. 28</sub> saw a case in which  $\frac{1}{10}$  grain (0.0064 gram.) produced thirst, a burning sensation in the throat, numbness, and loss of power. G. Lemoine<sup>55</sup><sub>July 14</sub> concludes from his review of the experience of others and from his own that hyoscyamine is a serviceable hypnotic, having most of the advantages of its rivals and none of their disadvantages. It is entirely harmless in doses which are still sufficiently strong to be effective. P. W. MacDonald<sup>131</sup><sub>Dec. 27</sub> recommends hyoscyamine as a useful hypnotic. It is valuable in recurrent cerebral excitement in robust subjects. Small repeated doses are better than one large dose. Musser<sup>53</sup><sub>Feb. 10</sub> gives  $\frac{1}{20}$  grain (0.00054 gram.) internally every three hours for the spasmodic asthma of emphysema.

*Hypericum* (*St. John's Wort*).—F. A. Burrall<sup>138</sup><sub>Apr.</sub> recommends the *oleum hyperici*—the old popular preparation of the flowers of *St. John's wort* extracted by olive-oil—for contusions, on the ground that when applied immediately it will largely prevent the ecchymosis which would otherwise follow. He has also found it valuable in otalgia in children from uncertain cause, the method of procedure being to drop a few drops, previously warmed, into the ear.

*Ichthyol*.—Ichthyol continues to be used extensively, both as a topical application and for internal treatment. Lorenz<sup>4</sup><sub>July 16</sub> has treated 48 cases with the sulphichthyolate of soda in doses increasing up to about 20 grains (1.30 gram.) a day, and considers that it



has a peculiarly favorable influence on the general condition. Its action was especially good in rheumatism, in which disease the author was able with it to produce results unattained with other drugs. An apparently hopeless and bedridden case of chronic nephritis lost all trace of albumen from the urine under its use during 3 months, and regained apparently perfect health. G. Meyer,<sup>4</sup> speaks by no means so favorably of the drug. Out of 17 patients with arthritis deformans no effect at all was observed in 14, and in 100 the disease appeared to become worse. Only in 1 case were the results satisfactory. Three of the patients suffered from a sensation of great weariness while taking the drug, and 4 had nausea, vomiting, burning in the throat, and unbearable eructation of the unpleasant taste of the ichthyol. Contrary to the experience of others, he did not find that as time passed the patients grew accustomed to the taste and smell of the drug or bore it any better. Nussbaum<sup>116</sup> has seen the violent gouty pains disappear under the external application of an ichthyol ointment. The internal administration of the drug proved of service in a great variety of affections, all of them, however, depending on a vascular dilatation. The medicine acts by contracting the vessels, and is, therefore, useful in chronic rheumatism, many neuralgias, various cutaneous diseases, asthma, chronic inflammation of the pharynx, etc. He gives it in pills, each holding 0.1 gram. (1.5 grains), of which the patient at first takes 2 twice a day, and finally 12 twice a day if necessary. Blittersdorf<sup>116</sup> reports a case of chronic nephritis in which many other medicines had been tried in vain, but in which the subjective symptoms entirely disappeared under the long-continued administration of 1 gram. (15 grains) of ichthyol daily. He considers that this case confirms the views of Nussbaum regarding the influence of ichthyol on the blood-vessels. My own experience with it, both in rheumatism and nephritis, has been very unsatisfactory, though the number of patients thus treated has been too small to allow of conclusions being drawn. E. Martin,<sup>9</sup> used with success a 10 per cent. ointment of ichthyolate of ammonium with lanoline in several cases characterized by inflammatory enlargement, and in some instances in which pain, depending probably on inflammation, was the principal feature. In adenitis, however, he obtained no good results with it. In a case of erysipelas of the scalp an immediate cure was effected by

the application of equal parts of lanoline and the ichthyolate. R. M. Slaughter<sup>81</sup><sub>July</sub> also observed a case of erysipelas of the face arrested by the application of an ointment of ichthyol, and believes that it is a useful application in mastitis. He has found it relieve the pain and soreness in mumps and its metastasis, in tenderness of the ovary, sprains, and in contusions.

*Inula Helenium*.—Landry<sup>26</sup><sub>Apr. 2</sub> has great faith in this plant in the treatment of elephantiasis. The affected part is bathed in a strong decoction of the root every day for 2 weeks or more, 2 to 6 fluidounces (62 to 186.6 gram.) of it being also taken internally 3 to 4 times a day.

*Iodine—Hydriodic Acid—Iodides*.—*Iodine* itself, in the form of the tincture, is strongly recommended by Rivadeneyra,<sup>6</sup><sub>Jan. 2</sub> for application to the surface of the abdomen in ascites due to the general condition of malarial poisoning. J. R. Hill,<sup>53</sup><sub>Feb. 12</sub> after examining several specimens, calls attention to the well-known fact that the title, "decolorized tincture of iodine," is a misnomer and is misleading, since the preparation contains no free iodine whatever. Labbé<sup>62</sup><sub>Feb. 1</sub> finds iodine diluted to  $\frac{1}{10}$  or  $\frac{1}{5}$  a very useful application in whooping-cough, applied on cotton to the glottis. The *iodide of starch* has given good results in the hands of Yérsienko<sup>14</sup><sub>Oct. 7</sub> as an intestinal disinfectant in typhoid fever, diarrhoea of infants and of adults, and other troubles of the gastro-intestinal apparatus. The dose used was 0.0015 to 0.0025 gram. ( $\frac{1}{45}$  to  $\frac{1}{25}$  grain) for children, and 0.005 gram. ( $\frac{1}{8}$  grain) for adults, repeated several times a day. *Hydriodic acid*, prepared as a syrup, has been used by several writers. E. Wildman<sup>178</sup><sub>May</sub> recommends it as an unirritating and practical form in which to administer iodine. With doses of 1 to 2 drachms (1.9 gram.) in water every 3 hours he has relieved the pains of acute rheumatism without the use of opiates, and has also found it successful in secondary syphilis, and in goitre and other glandular enlargements. W. H. Bentley<sup>176</sup><sub>Jan., May</sub> has used it in 33 cases of acute pneumonia and always with good results. He has kept notes of 19 cases of acute rheumatism in which he has used it, and says that he has never found its equal in this disease, though it appears to be of no value in gout. It is very serviceable in acute and chronic bronchitis and in the convalescence from measles and pneumonia. He reports a case of inveterate psoriasis cured by it after several other

remedies had been given in vain. The dose is 1 to 2 drachms (1.9 gram.) for adults. W. C. Wile,<sup>74</sup> calls it his favorite prescription in all asthmatic troubles. It can be given in chronic bronchitis of long standing where iodide of potash cannot be tolerated for a moment, and will act most favorably upon it. Given to a case of obesity it produced a steady diminution of the amount of fat without a single bad symptom. He has had a very large experience with it in chronic lead poisoning, and depends almost entirely upon it. In all the advanced stages of syphilis its action has been excellent, and it is useful in scrofulous affections of children. Finally, the author found it of service in eliminating arsenic and mercury from the system in artisans poisoned with these metals, and reports a case of chronic rheumatism which recovered under it after every other remedy known to him had failed. There has been some difference of opinion noted regarding the relative value of the *iodides*. R. Cory,<sup>2</sup> <sup>May 28</sup> prefers the iodide of sodium to that of potassium, on the ground that it is less apt to produce nausea, loss of appetite, and emaciation. Besides this, it contains more iodine in the proportion of 10 to 9. G. Sée,<sup>14</sup> <sup>Aug. 15</sup> on the other hand, claims that it is an error to suppose that potassium salts are especially poisonous to the heart. The Irishman eating 1200 to 1300 gram. (2½ to 3 lbs.) of potatoes a day ingests in them 72 to 80 gram. (3 18 to 20) of potash; and "what is this," he asks, "compared with the 2 gram. (30.8 grains) of iodide of potash usually given daily?" The sodium salt has no advantage, and is just as liable to produce iodism. The iodides are useful (1) for dyspnœa of a secretory nature, by liquefying the catarrhal products; (2) in troubles of intrapulmonary circulation, by producing hyperæmia and thus removing venous stasis; (3) for reducing the volume of aneurisms, by retracting the adventitious walls and the tissues surrounding them; (4) for reducing the size of a tumor and thus relieving the symptoms of compression; as, for example, in the case of the pressure of aneurisms on the recurrent laryngeal nerve. This author,<sup>212</sup> <sup>July</sup> has for a long time employed iodide of potash not only in asthmatic dyspnœa, but in that of cardiac origin. He considers it a true cardiac medicament, though its effects are less marked when there is a lesion of the valves than when the cardiac muscle is involved. In both cases, however, it generally succeeds in removing the dyspnœa, at least for a time. C. M.

Vance<sup>224</sup> has had excellent results with iodide of potash in rheumatic affections, but lays stress on the importance of rapidly increasing the dose until constitutional effects are manifest. An instance of the toxic effects of iodine is reported by F. Hewkley,<sup>2</sup> who saw a case of fugitive iodism, characterized by an urticarial erythema on the cheeks and a coryza and great puffing of eyelids on the left side of the face.

*Iodoform.*—The employment of iodoform internally is recommended by Huchard,<sup>3</sup> who has administered it in doses of 0.2 to 0.3 gram. (3 to 4½ grains) to a case of intestinal hæmorrhage, due probably to tuberculous ulceration of the intestine. The hæmorrhage ceased after some days, and the author attributes this to the action of the drug, since other remedies had been given without avail. Chauvin and Jorissenne<sup>73, 80</sup> have used it combined with tannin in 14 cases of pulmonary hæmorrhage with such good results that they have abandoned all other methods of treatment in this affection. It is more rapid than ergotin, and will succeed in cases where this fails. With reference to the use of the drug topically, Howard<sup>40</sup> recommends in syphilitic cases a dusting powder of iodoform, 100 parts; thymol, 200 parts; sugar, 1 part; or an ointment of iodoform, 4 gram. (61 grains); balsam of Peru, 8 gram. (2 drachms); vaseline, 40 gram. (31 32); oil of peppermint, 8 drops, may be employed. In granular inflammation of the lids he has found a powder of iodoform, 1 part; sugar, 5 parts, very successful. In burns a good salve was iodoform, 4 gram. (1 drachm); ext. of conium, 2 gram. (½ drachm); carbolic acid, ½ gram. (7½ grains); rose ointment, 30 gram. (1 ounce). R. Chrobak<sup>317</sup> writes in favor of the iodoform wick recommended by Gersung and described in the ANNUAL for 1888. He finds it an excellent method for drainage, and much superior to iodoform gauze. It is especially useful after the removal of abdominal tumors, where there has been free oozing from tears in the peritoneum. Colleville<sup>219</sup> makes use of an ointment of 40 parts vaseline, 2 parts iodoform, and 4 parts camphor in the treatment of variola. He claims that it stops the burning, prevents odor, disinfects the pustules and dries them up in 2 to 3 days without leaving any trace of cicatrix. S. Ehrmann<sup>169</sup> advises the employment of the bituminate of iodoform on the ground that it is destitute of unpleasant odor, does not produce irritation of the healthy

skin, and does not cause a too luxuriant growth of granulations. He has carefully compared it with pure iodoform in the treatment of about 22 cases of soft chancres, as well as in some of suppurating bubo and of leg ulcer, and is strongly in its favor. Quite a number of the cases are reported in detail. Various devices have been proposed for concealing the unpleasant odor of the drug. Helbing<sup>9</sup><sub>Jan. 28</sub> finds the essential oil of *eyodia fraxinifolia* an agreeable and powerful deodorant, in the proportion of 2 drops to the ounce, and Cantrelli<sup>9</sup><sub>Sept. 1</sub> overcomes the odor by adding 1 part of menthol and 1 of oil of lavender to 20 parts of the drug. For the same purpose M. Charteris<sup>2</sup><sub>Jan. 2</sub> recommends musk, in the proportion of 1 grain (0.06 gram.) of the powder to 10 to 15 grains (0.64 to 0.97 gram.) of iodoform, while C. E. Dodsley<sup>31</sup><sub>Apr. 10</sub> considers oil of sassafras the best deodorant, 4 drops of the oil sufficing to conceal 1 ounce (31 gram.) of the powder. L. Genois<sup>9</sup><sub>Feb. 18</sub> speaks of the various means which have been employed for this purpose. Some of these destroy the drug, others are useless, and still others conceal the odor for a short time only. A deodorant which he recommends as entirely effective is naphthalin, to which a trace of turmeric has been added. He suggests the following formula: iodoform, 91 grains (6 gram.); purified naphthalin, 7½ grains (0.48 gram.); powdered turmeric, 1½ grains (0.1 gram.). This will entirely blot out the unpleasant odor. A useful ointment may be prepared by incorporating 2 drachms (7.77 gram.) of the deodorized iodoform with ½ drachm (1.94 gram.) of oil of almonds and 5½ drachms (21 gram.) of lanolin. In making an ethereal solution from the powder the turmeric should be omitted, as it is not soluble in ether. Coreil<sup>188</sup><sub>Sept. 16</sub> says that solutions of iodoform should be kept in green glass bottles, in order to prevent the liberation of iodine from them under the influence of light. A. Drescher<sup>80</sup><sub>Mar.</sub> determined that the change which takes place when iodoform and calomel are mixed is due to a double decomposition under the influence of light and heat, producing chloroform and mercurous oxide. Duret<sup>62</sup><sub>Aug. 16</sub> points out that there are 3 forms of intoxication by iodoform: (1) the eruptive, (2) the cerebral or delirious, (3) the syncopal or hypothermic. The first is most common, and is characterized by a rubeoloid eruption on various parts of the body. The second shows itself in epileptiform attacks or in insomnia accompanied by delirium. The third form is the most serious and is manifested by syncope and a very

pronounced subnormal temperature. Jeannel <sup>19</sup><sub>May 19</sub> says that iodoform delirium will not be produced by the application of the drug to a wound unless the patient is affected by an antecedent cerebral affection. Houzel <sup>91</sup><sub>Aug. 10</sub> saw deep sleep with complete anæsthesia of the cornea lasting 2½ hours follow the injection of 100 gram. (3 3 3 2) of a 5 per cent. ethereal solution of iodoform into a cold abscess, and Peyrot, <sup>91</sup><sub>Aug. 10</sub> also, has observed profound sleep produced in the same way. Quénu <sup>91</sup><sub>Aug.</sub> had a case of uncontrollable vomiting lasting 8 days (when the patient was lost sight of), apparently caused by the injection of 30 gram. (3 7 gr. 43) of a 10 per cent. ethereal solution of iodoform into an abscess. Meisenbach <sup>82</sup><sub>Jan. 14</sub> reports a case where the employment of iodoform as a surgical dressing seemed to act as an irritant and occasioned dermatitis, and H. I. Ostrom <sup>139</sup><sub>Mar.</sub> has noted that pure iodoform applied to uterine cancer is not infrequently followed by hæmorrhage within 12 hours, and consequently recommends that it be used with caution in this affection. Behring <sup>80</sup><sub>Mar.</sub> recently administered a 20 per cent. solution of bicarbonate of potash to a case of iodoform poisoning. The best results followed, the medicine seeming to act as a direct antidote.

*Iodol*.—Assaky <sup>17</sup><sub>Mar. 18</sub>; <sup>61</sup><sub>Apr. 28</sub> found that operation wounds dusted with iodol healed by primary union, while in suppurating wounds it checked very greatly the secretion of pus. As it is not poisonous, it may be applied freely. It is an excellent dressing for indurated chancres. Internally, in doses of 0.4 to 0.2 gram. ( $\frac{2}{5}$  to  $\frac{1}{5}$  grain) per day, it constitutes a valuable treatment for the lesions of tertiary syphilis and surgical scrofulosis. It does not cause albuminuria. Porak <sup>152</sup><sub>Jan. 14</sub> has had a very favorable experience with uterine suppositories of iodol and cacao-butter for the treatment of fetid lochia. The temperature was reduced by them when the intrauterine injection of the drug or the application of an ointment of it had no beneficial effect. V. Martini <sup>505</sup><sub>July</sub> administered iodol in place of iodide of potash in chronic bronchitis and old pulmonary affections, and found that it was eliminated more easily than the iodide and that its therapeutic effects persisted a longer time.

*Ipecacuanha*.—C. Bernabei <sup>464</sup><sub>Nov. 2, '97</sub>; <sup>319</sup><sub>Feb. 4</sub> praises ipecacuanha in emetic doses of 1 gram. (15 grains), every 10 minutes, as the most powerful hæmostatic in severe hæmoptysis of phthisical patients. It is not dangerous, and he has never seen it fail, even in cases where all other measures had been useless.

E. B. Muskett,<sup>6</sup> has used ipecacuanha in about 50 cases of anthrax during the last 15 years, and without a single failure. He applies it externally, mixed with water to the consistence of cream, and administers it in full doses internally. In carbuncle, too, it appears to be a specific. L. B. Bouchelle<sup>17</sup> believes in the free use of ipecacuanha in pneumonia, all forms of bronchitis, and in croup. He claims that all his cases of diphtheria, if seen early, recover, the treatment being free emesis with ipecacuanha at first, the patient being kept on the verge of nausea afterward. Carbolic acid is also applied undiluted to the ulcers. He recommends emesis with the drug in icterus and in the first stages of typhoid and malarial fever. He is disposed also to produce vomiting in all his cases of dyspepsia—a treatment whose vigor most cases of dyspepsia would probably resent. W. Murrell<sup>22</sup> reports a few cases as typical examples of a number in which the spray of ipecacuanha proved serviceable in his hands. He has obtained the most successful results in chronic bronchitis and bronchial catarrh, though there is often improvement in fibroid phthisis, even when no constitutional treatment is employed. A single inhalation will sometimes restore the voice in hoarseness due to congestion of the vocal cords, and most cases of winter cough will be relieved in 10 days. The spray should be used warm for about 10 minutes 3 to 4 times a day, and the patient should not go out for some minutes after inhaling. Care should be taken that the arching of the tongue does not hinder the vapor from going into the chest. Either a hand-ball, spray apparatus, or a steam vaporizer may be employed.

*Jaborandi*—*Pilocarpine*.—Küthe<sup>19</sup> had a patient whom obstinate, continuous hiccough had brought very low, and for whom many therapeutic measures had been employed without relief. Prompt success, however, followed the administration of a decoction of jaborandi. W. Kosegarten<sup>66</sup> reports some cases of aural disease to which hypodermic injections of  $\frac{1}{6}$  grain (0.01 gram.) pilocarpine were given daily, the treatment being continued for at least 6 weeks. He says it seems evident that the injections have a decided influence upon the mucous membrane of the middle ear, producing a more active circulation. He recommends it, therefore, in chronic affections of the middle ear and in involvement of the labyrinth. The returning hyperæmia produces pliability of the sclerosed tissues and softening and moistening of the adhesions.

Corradi<sup>328</sup><sub>Ed. 28, B. 1, May</sub><sup>65</sup> details an interesting case of deafness, lasting many years, greatly improved by hypodermic injections of pilocarpine, though perhaps but temporarily. J. Phillips<sup>2</sup><sub>Oct. 12</sub> concludes, from his own experience and the collated experience of others with pilocarpine in pregnancy and the puerperal state, that, while the drug is capable of inducing labor in a certain number of cases, it is in no sense reliable as an ecbolic. During the dilating and expulsive stages of labor it is as powerful as, and more certain than, ergot in increasing labor pains, but with none of its ill-effects. Cases of simple uterine inertia are most suitable for its employment. It has no power to arrest hæmorrhage. Although the good effects of the drug in eclampsia have been reported in a number of instances, yet in others such dangerous symptoms developed that the author warns against its use, especially if coma be pronounced. D. Benezúr and S. Csátáry<sup>2</sup><sub>Feb. 25</sub> conclude, after a series of articles on pilocarpin in Bright's disease, that the drug will nearly always diminish dropsy sufficiently to protect more or less against the danger of suffocative attacks, even when hot-air baths and other diaphoretics prove useless. W. J. F. Churchouse<sup>2</sup><sub>Jan. 25</sub> reports an alarming case of uræmic convulsions relieved repeatedly by the hypodermic use of pilocarpine until complete recovery ensued. E. Mitchell<sup>72</sup><sub>Nov.</sub> has used pilocarpine with success in trismus and in diphtheria. In one case alarming depression followed the internal administration of  $\frac{1}{8}$  grain (0.01 gram.) to a child. Van Eman<sup>72</sup><sub>Nov.</sub> tried the drug in a number of cases of uræmic poisoning, but all of them died in spite of it. He is afraid of it in diphtheritic laryngitis. A. B. Sloan<sup>72</sup><sub>Nov.</sub> has obtained only discouraging results from it in diphtheria. G. W. Davis<sup>72</sup><sub>Nov.</sub> quickly brought a patient out of a condition of alcoholic coma by the administration of pilocarpine and a hot-air bath. Lanphear<sup>72</sup><sub>Nov.</sub> advises caution in the use of what may prove a dangerous drug, as fatal or alarming symptoms may be produced by it. From his experience in 2 cases H. Magnus<sup>116</sup><sub>Feb.</sub> concludes that a preparation of pilocarpine previously active may suddenly lose its power entirely.

*Jambul.*—H. Fenwick<sup>139</sup><sub>Feb.</sub> found that jambul in doses of  $2\frac{1}{2}$  to 3 grains (0.16 to 0.19 gram.) in pills 3 times a day diminished the amount of urine and the percentage of sugar in diabetes, while sloughing ulcers attending the disease healed with surprising rapidity. In simple polyuria no effect was noticeable. W. H.



Morse<sup>104</sup><sub>Oct. 29, '12</sub> also claims that the drug lessens the amount of sugar and of urine eliminated in diabetes. T. Oliver,<sup>4</sup> on the other hand, has treated 4 cases of diabetes with the drug, beginning with a dose of 5 grains (0.32 gram.) and increasing to 15 grains (1 gram.) three times a day, but without convincing himself that the slightest benefit was obtained from it.

*Liparin.*—(See *Aliments.*)

*Litholeine.*—(See *Petroleum.*)

*Loofah.*—J. B. Roberts<sup>104</sup><sub>May</sub> writes of the value of loofah, or the "towel-gourd," for scrubbing the integument in aseptic operations. When wet it is harder than a sponge, but rather softer than a bristle brush. Cut into segments, it is not only very cheap, but by its use the necessity of carrying away wet brushes from the patient's house is avoided.

*Kawa-Kawa.*—N. Weinstein,<sup>80</sup><sub>July 11</sub> has tried kawa in 30-grain (1.9 gram.) doses every 3 hours in various diseases. It relieved the pain of acute articular rheumatism, but had no effect on the duration of the disease. In emphysema and tuberculosis it acted well upon the dyspnœa, while in hydrops its action was diuretic. In gonorrhœa and catarrh of the bladder it quieted the nerves of the bladder, but did not affect the gonorrhœal process. In small doses it influences favorably chronic catarrh of the stomach and dyspepsia.

*Kefir.*—(See *Aliments.*)

*Koumiss.*—(See *Aliments.*)

*Lactic Acid.*—Hayem,<sup>6</sup><sub>Feb. 11</sub> is known as a champion of lactic acid in infantile diarrhœa, and still further praises its action, especially when the stools are green and acid in reaction. He advises larger doses than formerly, giving 30 teaspoonfuls of a 2 per cent. solution in the 24 hours. In certain cases of chronic diarrhœa in the adult he has found the medicine of value in doses of 2 to 3 dessertspoonfuls  $\frac{1}{2}$  to 1 hour after meals. Sevestre<sup>177</sup><sub>Feb. 14</sub> has also had good results with lactic acid in the green diarrhœa of infants, using, however, larger doses, *i. e.*, a teaspoonful every 5 to 10 minutes. J. Chéron<sup>154</sup><sub>Feb. 1</sub> recommends the topical employment of equal parts of lactic acid and water in rodent ulcer of the vulva. Under the influence of the application resolution of the induration commences and the wound ends to heal. When scraping and scarification are also used recovery is more rapid than

under any other treatment known to him. Aysaguer<sup>136 62</sup> uses the drug, pure or diluted, for destroying granulations in aural suppuration. Luc<sup>17 9</sup> reports a case of tuberculosis of the larynx healed by destroying the granulations by the cautery, followed by the application of lactic acid and iodoform, and A. J. Beehag<sup>36</sup> would likewise favor the application of lactic acid in laryngeal phthisis. Doyen<sup>287 25</sup> has used it locally with success in lupus and epithelioma. The acid, of the consistence of syrup, is applied on absorbent cotton, and allowed to remain 15 to 20 minutes, until sufficient destruction has taken place. The treatment is not painful and can be given every day. The surrounding healthy skin should be protected by resin plaster or lanolin.

*Lemon Juice.*—Geneuil<sup>39</sup> has met with great success in the treatment of epistaxis, when all other remedies had failed, by injecting lemon-juice into the nasal passages. He first injects cold water to remove clots, and then a syringeful of freshly expressed lemon-juice. Usually one syringeful is enough, but the injection is repeated in a minute or two if necessary.

*Magnesia.*—L. Lewis<sup>19</sup> reports a case on which warts about the glans penis appeared to melt away rapidly under the influence of the internal administration of 1 grain (0.06 gram.) of sulphate of magnesia every hour, continued for 3 weeks. (See also "Carbolic Acid.")

*Manganese—Permanganate of Potash.*—J. N. Upshur<sup>462</sup> says that the oxide of manganese should be given in the form of gelatine-coated pills, and is far less disagreeable to the stomach than the permanganate of potash. The dose should be 1 to 2 grains (0.06 to 0.13 gram.) after meals, and the remedy should be continued for a month or more. He advises it in amenorrhœa due to an impoverished or cachectic condition of the blood, defective vascular supply, plethora, and obesity, etc.—in fine, whenever the menstrual derangement is brought about by functional and not mechanical causes. Ivoff<sup>9</sup> has treated some 200 cases with permanganate of potash. He found it of service in dysmenorrhœa in otherwise healthy girls, in excessive subinvolution after childbirth, in atrophy during puerperal affections, and in pelvic peritonitis after labor. The remedy proved of little avail in affections of the tubes and ovaries in which the gonococcus was found, and in atrophic conditions of the uterus from early appearance of the

menopause. P. Popoff<sup>571</sup><sub>Ne. 19, W. ; Feb. 15</sub> has successfully treated upward of 300 cases of toothache from dental caries by administering  $\frac{1}{2}$  solution of permanganate of potash in the form of a mouth-wash. One tablespoonful was taken into the mouth every half hour, and held on the affected side for several minutes. The agonizing pain is said to disappear in a few hours.

*Mentha—Menthol—Peppermint.*—Dana<sup>50</sup><sub>Sept. 20</sub> has given menthol internally with success in migraine and other painful disorders, the dose being 5 to 20 grains (0.016 gram.) three times a day. It may be administered in capsules, or, better, in a 20 per cent. alcoholic solution in a wineglass of hot water. (Giacomi<sup>2</sup><sub>Apr. 20</sub> has been disappointed in menthol given internally as a remedy for anorexia, and Daettwyler<sup>2</sup><sub>Apr. 20</sub> also has found it to produce nausea instead of improving the appetite. A. J. Beehag<sup>36</sup><sub>Jan.</sub> advises the injection into the larynx in laryngeal and pulmonary phthisis of a 20 per cent. solution of menthol in olive-oil. At each sitting 2 to 3 injections of 15 minims (0.97 gram.) each should be given, the fluid being deposited on the part affected when the larynx is diseased, but in the trachea when the lungs only are involved. The procedure should be carried out once or twice daily for about 2 months. Ulcers of the larynx heal nicely under it. Remington<sup>224</sup><sub>Mar. 12</sub> recommends oleic acid as a useful solvent of menthol. Two hundred grains (13 gram.) of the latter may be dissolved in  $\frac{1}{2}$  fluidounce (15.5 gram.) of the acid and the combination forms a valuable remedy in pruritic affections. A. Routh<sup>2</sup><sub>Apr. 14</sub> recommends for obstinate pruritus pudendi a mixture of 1 pint of water, a teaspoonful of borax, and 5 drops of oil of peppermint. This lotion will remove the itching if no eczema or abraded surfaces are present, in which case it is not applicable. Borax is used in order that more of the peppermint may be held in solution. Peppermint in many cases excels all other drugs, including cocaine. Girard<sup>2</sup><sub>Apr. 20</sub> has tried a mixture of equal parts of menthol and iodoform in the form of a dry powder in 14 cases of scraping out and resection of tuberculous bones and soft parts. In every instance the wound healed more rapidly, and the general course of the case was more favorable than in another series of similar cases where iodoform alone was employed. W. L. Braddon<sup>6</sup><sub>Mar. 17</sub> recommends oil of peppermint as the safest and most agreeable of all known antiseptics for surgical use. He has also employed it as an inhalation in phthisis, and reports some cases

which show that it may be inhaled for an almost unlimited time without producing bad effects, that it has an immediately beneficial influence in some cases already in the later stages, and that early phthisis is checked by it, and even cured. In diphtheria, too, it forms a thorough and harmless antiseptic for local use. The author reports two cases of extensive and rapidly spreading pharyngeal ulcers covered by membrane where the process was promptly arrested by the application of the pure oil twice daily.

*Methyl Chloride.*—Bailly<sup>12</sup><sub>Apr.</sub> applies chloride of methyl on plugs of cotton-wool surrounded by floss-silk, and these again by gauze. This seemed to be the best apparatus for imbibing and preserving the refrigerant fluid. He has in this way soothed the pain of 26 cases of toothache, 9 of facial neuralgia, 8 of sciatica, and 14 of lumbago. In 62 cases of other forms of neuralgia recovery was almost invariably the result of the treatment. Bouchard<sup>12</sup><sub>Apr.</sub> found this method efficacious in pains of different kinds, and Vidal<sup>12</sup><sub>Apr.</sub> has performed 120 various operations after anæsthesia had been obtained by the chloride of methyl in this way. E. de Smet<sup>80</sup><sub>Apr.</sub> also writes in praise of Bailly's method of applying the drug, and mentions a case of pain and spasm in the course of the fifth nerve which had lasted over a year, and which immediately yielded to this treatment. Huchard<sup>25</sup><sub>July 20</sub> used the spray of methyl chloride in a case of chorea; but though improvement followed promptly, he does not consider the test conclusive. In several cases of spinal irritation the results with the spray were satisfactory. W. M. Thallon<sup>157</sup><sub>Jan.</sub> has been trying the effect of the intense cold produced by methyl chloride. One case which he reports was an instance of neuralgia of the musculospiral nerve for the relief of which various remedies had been used without avail, but which was cured by a few applications of the spray. Another patient suffered from facial neuralgia, the pain of which was banished by a single application. A third case, one of severe and persistent pain following milk leg, was decidedly relieved by one application, though other remedies had proved useless. The end of the spray-tube should be held 8 to 12 inches from the skin, and the time of the application over any one area should not last over one second. As large a portion as possible of the cutaneous distribution of the affected nerve should be acted upon at one sitting. As soon as the skin becomes pale or hard the application must be

stopped or a blister, or even a slough, may be produced. A. Jacob<sup>157</sup><sub>Jan</sub> has treated 5 cases with the spray, one of these being an example of trigeminal neuralgia. Complete relief followed the first application, and the pain did not return. A patient with neuralgic pain extending from the nipple through to the shoulder-blade obtained instantaneous though not permanent relief. The author has seen an instance of pigmentation of the skin produced by the treatment.

*Methylal*.—Krafft-Ebing<sup>116 90</sup><sub>Feb.; Oct. 11</sub> used hypodermic injections of 0.1 gram. ( $1\frac{1}{2}$  grains) of methylal in 21 cases of delirium tremens. He concludes that there is no doubt of its efficiency in producing sleep lasting 8 to 20 hours. In 6 cases only one dose was required, but in others the injections were given every 2 hours until sleep was produced. In no case did the remedy disappoint, though in some instances 24 hours elapsed before the patient fell asleep. During convalescence two injections were given every evening to guard against relapse. The sleep was natural, and there were no bad consequences observed. The injection caused some burning, but no inflammation. The author considers the drug the best sleep-producing agent in delirium tremens. In any severe delirium of this nature and in hallucinatory insanity he has seen it succeed after other remedies had failed. It is in no sense a tonic for an exhausted brain, and it is, perhaps, on this account that the tremor persists long into the convalescence from delirium tremens. Hadjès and Boubila<sup>18</sup><sub>Nov. 3</sub> report on methylal as serviceable in chronic mental disorders, but not in acute melancholia and mania. They have given it internally in doses of 45 minims to 2 drachms (2.91 to 7.77 gram.) without ill effects. In 6 days the power of the drug is gone, but returns after an intermission of 3 days.

*Methyl-Tri-Hydro-Oxy-Chinolin-Carbonic Acid*.—Demme was led<sup>116 25</sup><sub>pp. 64, 113; May 1</sub> by the similarity of this body to thallin to make clinical experiments with it in the form of a sodium salt. He tried it in various acute febrile disorders in patients from 4 to 15 years of age, the dose up to 6 years being 2 grains (0.13 gram.), and up to 12 years 4 grains (0.26 gram.). It appears that the new drug has some antipyretic properties, and that it has some effect in increasing blood pressure.

*Mistletoe*.—B. H. Brodnax<sup>176</sup><sub>July</sub> calls attention to the oxytocic

powers of mistletoe. Having seen it used for cattle, he tried a strong decoction and a fluid extract of it among his patients, and found it acted admirably in inciting contractions in uterine inertia. He has also given it in about 20 cases of hæmorrhage from the bowels with good results. A very interesting historical article on mistletoe has been <sup>22</sup><sub>Dec. 21, '77</sub> contributed by G. Foy. D. E. Gray <sup>117</sup><sub>July</sub> has used a saturated tincture of the fresh leaves as an oxytocic. He has given it many times in labor cases in which the pains were cramp-like, rather than expulsive, and reports several cases, also, in which he administered it with the best results for the arrest of uterine hæmorrhage from different causes. The dose was 15 drops to 1 fluidrachm (3.88 gram.) repeated every 15 to 20 minutes until 5 to 6 doses have been taken. E. W. Lane <sup>117</sup><sub>July</sub> says that he has used mistletoe with success in many cases.

*Myrobalan*.—*Phyllanthus Embilica*.—P. Apéry, <sup>80</sup><sub>Mar.</sub> after giving a complete history of this drug, recommends it in dysentery, diarrhœa, and chronic catarrh of the stomach, having never failed with it to lessen the purging immediately. Numerous other practitioners have at his suggestion used it with equally good results.

*Nabalus Altissimus*.—S. T. Landry <sup>121</sup><sub>Jan.</sub> reports a case of traumatic gangrene in which the intense pain of the blackened leg was almost instantly relieved by the application for 12 hours of the fresh leaves of this plant. By persisting in these applications, alternated with that of moistened old tobacco-leaves, recovery ensued without the loss of the leg.

*Narceine*.—(See *Opium*.)

*Naregania Alata*.—Hooper <sup>9</sup><sub>Mar. 21</sub> introduces to the notice of physicians this plant, which is used by the natives of Malabar for bilious disorders and rheumatism. An alkaloid, naregania, derived from the bark, is an active antidysenteric remedy and emetic, resembling ipecac. Its dose is 15 grains (0.97 gram.). As an expectorant it may be given in smaller doses.

- *Nitrites* (*Nitroglycerine*, *Nitrite of Amyl*, *Potassium Nitrite*).—E. B. Ward <sup>61</sup><sub>Mar. 10</sub> reports a case in which complete and almost instantaneous relief was repeatedly given to a patient with intense dyspnœa in Bright's disease, by administering 3 drops of *nitrite of amyl* in a teaspoonful of brandy. As a result of clinical researches Bals and Broglia <sup>14</sup><sub>May 20</sub> say that the *tertiary nitrite of amyl* has the same properties as the ordinary variety, but is to be preferred to it

for several reasons. Its action is more marked and more lasting; it does not produce heat, tension, and throbbing of the head; it can be inhaled without inconvenience or danger in relatively large quantities (80 to 100 drops a day), and it has a slightly hypnotic power. *Nitroglycerine* is recommended by Holst<sup>12</sup><sub>Apr.</sub> in states of cardiac weakness from any cause. Where, however, there is organic affection of the heart the result, he says, is not obtained. It is impossible to prescribe fixed doses of it, the amount which can be ingested depending on the susceptibility of the patient. L. J. Lautenbach<sup>92</sup><sub>Jan.</sub> has found nitroglycerine of value in many cases of tinnitus aurium, especially in those where cardiac disease existed and where there was little or no loss of hearing. During the day  $\frac{1}{100}$  of a grain (0.00065 gram.) was given, and the dose increased until the tinnitus was diminished or headache produced. In cases of long standing treatment sometimes had to be continued 1 to 3 months before a satisfactory result was obtained. M. H. Fussell<sup>19</sup><sub>Nov. 18, 1888</sub> reports 3 cases of cardiac failure in heart-disease and in typhoid fever treated successfully by the hypodermic injection of nitroglycerine. In all of them death seemed imminent. The author calls attention to the very rapid action of the remedy, and to its superiority to digitalis and alcohol where there is no time to lose. M. H. Lackersteen<sup>139</sup><sub>May</sub> details an interesting instance of complete collapse from the passage of gall-stones, in which neither pulse nor respiration could be detected. Under the influence of an injection of 10 drops of a 1 per cent. solution recovery rapidly ensued. Another case of apparent death after a submersion in water lasting 3 minutes had been treated with electricity without effect, 3 minutes after a hypodermic injection of nitroglycerine had been given evidences of life were apparent. A third case was that of a still-born child, and a fourth an instance of asphyxia from illuminating gas, both successfully treated in the same manner. D. D. Stewart<sup>119</sup><sub>Aug.</sub> reports a remarkable instance of tolerance of the drug. The patient, a case of parenchymatous nephritis, of his own accord increased the dose taken, until he was ingesting 130 drops of a 5 per cent. solution 4 times a day. Very little constitutional effect was to be observed, except a moderately flushed, somewhat dusky face, a pulse of 120 per minute, with decided dirotism, and a feeling of muscular weakness. J. W. Springthorpe<sup>285</sup><sub>Aug. 16</sub> records 2 cases of dropsy in

which it was administered to relax vascular spasm. Under its influence the secretion of urine was largely augmented and the reduction of the dropsy brought about. W. Osler<sup>242</sup> has employed it in increasing doses in 19 cases of epilepsy. The physiological effect must be obtained before good can be expected. In 9 cases there was improvement, usually within 7 to 10 days. He cannot, however, regard this as more than temporary, and can only recommend that the remedy be tried when the bromides have failed or are beginning to lose their effect. The *cobalto-nitrate of potash* is recommended by J. W. Roosevelt<sup>1</sup> in  $\frac{1}{2}$ -grain (0.032 gram.) doses every 2 to 4 hours for such cases as would ordinarily be treated by the nitrites. The author reports several of these, which, with others, lead him to believe that the salt is worthy of further trial. It is easily prepared, safe, stable, and cheap. The effects seem to begin in 15 minutes to 1 hour after ingestion, and to last sometimes for 3 to 4 hours.

*Nux Vomica—Strychnia.*—Popow<sup>161</sup> reports two cases of dipsomania which promptly recovered under treatment with hypodermic injections of strychnia. Lauder Brunton<sup>15</sup> has used the alkaloid successfully for insomnia in those who are overtired from mental worry or work. He gave it on the ground that the strongly stimulating action of strychnia might bring the system out of the condition of overfatigue into one of simple fatigue, which itself is conducive to sleep. S. Jaroshevski<sup>530</sup> <sup>60</sup> <sub>No. 4, 37, Feb. 1</sub> says that strychnia may be used in all forms of alcoholism, and is a powerful prophylactic against it. L. A. Merriam<sup>106</sup> <sub>May</sub> recommends strychnia for increasing nerve power, but says that it should be given in divided doses every  $\frac{1}{2}$  to 1 hour, instead of 3 to 4 times a day. He prefers the arseniate and hypophosphite.

*Olive-Oil.*—(See *Aliments*.)

*Opium and its Alkaloids.*—G. Veit<sup>80</sup> <sub>June</sub> has had an experience in more than 60 cases of puerperal eclampsia. In these cases he recommends the production of prolonged narcosis by large doses of *morphia*, at the same time attending to the state of the kidneys. S. H. Scheiber<sup>1</sup> <sub>Oct. 13</sub> reports a case in which acute hallucinatory paranoëa, lasting 6 weeks, followed acute morphia poisoning, from  $\frac{1}{4}$  grain (0.0486 gram.) of morphia given to an hysterical woman. On the other hand, C. M. Decker<sup>109</sup> <sub>June</sub> gives an instance of extraordinary tolerance of morphia in a patient not habituated to the use of the



drug. The case was one of obscure pelvic or abdominal disease, in which, on account of the severe pain threatening life, 60 grains (3.89 gram.) of morphia were given within 24 hours. Another remarkable instance of tolerance toward it is that described by W. M. McLaury,<sup>1</sup> a case of chronic hydrocephalus in a child of 7 months, who had been given morphia in increasing doses until 10 grains (0.647 gram.) a day were being ingested. *Codeine* has been used extensively for 5 years by Thurgau,<sup>214</sup> who substituted it in all cases in which morphia is generally employed, except in those with severe pain, for which he deems the latter preferable. It is an excellent narcotic, and has not the unpleasant after-effects and dangers of morphia, while it is especially useful in the cough of phthisical patients. J. Matthews,<sup>2</sup> found codeia useful in a case of vomiting, sometimes of blood, occurring at the menopause, in which he had tried nearly everything likely to benefit without avail. Lauder Brunton,<sup>2</sup> reports several cases treated with codeine, and sums up his experience by expressing his confidence in its powerful action in relieving abdominal pain. It can be pushed to a much greater extent than morphia without causing drowsiness, if interfering with the action of the bowels. It is therefore especially indicated in cases where the action of morphia is feared. He has found it useful in relieving pain for months together in long-continued cases of enteralgia, with or without malignant disease, and it does not appear to lose its effect. Where there is diarrhoea morphia or opium is to be preferred, as codeia has no tendency to lessen peristaltic action. The dose given was  $\frac{1}{2}$  grain (0.0324 gram.) t. d., increased until the pain is controlled. G. C. Kingsbury,<sup>2</sup> corroborates these views as regards the value of the alkaloid where morphia is contra-indicated. He refers also to a case of asthma successfully treated with it after injections of morphia had failed. *Meconarceine* is recommended by J. V. Laborde and A. Duquesnel<sup>164</sup> for simple insomnia or that occurring in various diseases, for pertussis, and in bronchial and bronchopulmonary diseases where cough and hypersecretion are the chief symptoms; for certain neuralgias, where it may well be substituted for morphia; and for all cases of morphia habit in which it is desired to avoid this drug.

*Orthosyphon Stamineus*.—Frochard<sup>100</sup> <sup>2</sup> recommends orthosyphon stamineus, in the form of "Java tea," as a powerful diuretic in the treatment of gravel and arthritis.

*Osmic Acid.*—Grinevitski<sup>15</sup><sub>Sept.</sub> advises for muscular rheumatism the injection into the parenchyma of the muscle of 8 drops of a 1 per cent. solution of osmic acid, and that the dose be gradually increased to a syringeful. Large doses have advantages over small ones, as fewer injections are needed, and the frequent repetition of the burning pain which they cause is thus avoided. They also act more promptly and with greater certainty. Seeligmüller<sup>116</sup><sub>Dec. '97</sub><sup>9</sup><sub>Jan. '98</sub> has treated intercostal neuralgia by hypodermic injections of 1 per cent. to 10 per cent. solution of the acid. The injections were made deeply into the muscles along the spine, and gave sharp pain at first, followed later by relief.

*Oxygen — Ozone — Hydrogen Peroxide.*—A. J. Hodgson<sup>281</sup><sub>July</sub> believes that oxygen stimulates the organic activity of the red blood-cells, and that it can be used with success in anæmia, albuminuria, dyspepsia, and all wasting diseases. S. S. Wallian<sup>99</sup><sub>Apr. '98</sub> writes again (see the ANNUAL for last year) in favor of the medicinal employment of oxygen. He claims, however, that when given from a receiver in which it has been compressed, by no means can such good effects be produced as when the gas is given perfectly fresh, made at the bedside. He considers this nascent oxygen to be as different from the ordinary oxygen of the atmosphere as though it were in reality another element. It is, indeed, to the presence of ozone that the therapeutical effects of oxygen are due. He has found it of especial value in uncomplicated asthma and the chronic indigestions. J. Aulde<sup>62</sup><sub>Sept. 1</sub> reports several cases—some of pulmonary diseases, some of debility from other causes—where the employment of inhalations of oxygen have been of marked benefit. Like Wallian, he condemns the use of the ordinary commercial gas compressed in hollow cylinders, and advises that a portable generator be employed, or that the gas be obtained by warming peroxide of hydrogen in a suitable inhaler. L. L. Todd<sup>56</sup><sub>Mar.</sub> details several cases of asthenic diseases illustrative of those in which he has used inhalations of peroxide of hydrogen with success. The oxygen thus derived is of peculiar power, because, as he believes, it contains ozone. F. Glasgow<sup>82</sup><sub>Feb. '98</sub> administered it internally to a patient with pneumonia, and observed a decided improvement in the color of the skin and the general appearance. The *peroxide of hydrogen* continues to be extensively employed for its local action. Pollak<sup>82</sup><sub>Feb. '98</sub> corroborates its favorably known

influence in otorrhœa. He instills 10 to 15 drops of it, and in this way thoroughly cleanses the ears of struggling and crying children. He favors it also in purulent affections of the eyes, and has employed it as a deodorant in incurable ozæna. Hatfield<sup>51</sup> has treated with success 18 cases of diphtheria by applying it to the throat with a swab or as a spray in the strength of 2 ounces (62 gram.) in 7 times its bulk of water. It does not act as a solvent on the membranes, but prevents the putrid changes and neutralizes the poison. W. D. Bizzell<sup>207</sup> used with marked success a 10 per cent. solution of peroxide of hydrogen, followed by plugging with iodoform cotton in a case of suppuration of the antrum which had not been benefited by other medication. He also found it valuable in a case of scrofulous abscess of the neck and in one of large perinephritic abscess. I. N. Love<sup>82</sup> has used the 3 per cent. ("10 volume") solution in a dilution of 1 in 3 to 4 as a local application in diphtheria, scarlatina, acute and chronic nasal catarrh, whooping-cough, follicular tonsillitis, reflex asthma, and cancer of the uterus. In diphtheria he has even used it in full strength. The results have been very satisfactory. He considers it an efficient means of cleansing purulent surfaces and of great value as a destroyer of microbes in the microbic diseases. It is important to procure a reliable preparation. Metal syringes should be avoided. D. V. Dean<sup>82</sup> has also employed it in diphtheria, and considers it of great service. F. Glasgow<sup>82</sup> injects it diluted with 1 to 2 parts of water into the nose in nasal diphtheria, and finds no other application necessary. He has noticed that when the child swallows some of the fluid the cheeks become redder and the cachectic look disappears. W. Moore<sup>82</sup> on the other hand, has not always found it to dissolve the membranes of nasal diphtheria. W. Porter<sup>82</sup> has used it with satisfaction for syringing an abscess of the antrum.

*Papain—Papoid—Carica Papaya.*—S. Ruark<sup>19</sup> much prefers papoid to pepsin and has had cases, 2 of which he reports, in which the latter and pancreatin entirely failed to improve digestion, while papoid was a complete success.

*Paraldehyde.*—A. B. Cook<sup>198</sup> recommends paraldehyde in the form of elixir, claiming that it is palatable and non-irritating to the stomach. He finds it not only a simple hypnotic, but serviceable in asthma, puerperal convulsions, and cough. He has used

it in many cases of pain where he would formerly have deemed opiates indispensable. Tchepetow<sup>586</sup><sub>Nov. 48, '97</sub> has not only obtained good results with paraldehyde in delirium tremens and in excited conditions in mental diseases, but has in phthisical cases produced tranquil sleep with 3 gram. (46 grains) of the drug. J. M. Keniston<sup>198</sup><sub>July 18</sub> considers it quicker than chloral and free from any unpleasant after-effects. It is an excellent hypnotic in cases of restlessness and excitement unaccompanied by pain, and is as safe as are the bromides. G. R. Butler<sup>157</sup><sub>May</sub> finds it of value as a simple hypnotic, but believes that when pain or cough are present it is useless. He has frequently found it of value in producing sleep in phthisical patients after the cough had been relieved by small doses of morphia or codeia. A. A. Rawson<sup>19</sup><sub>Jan. 2</sub> recommends the following formula: Paraldehyde, 2 fldr. (7.77 gram.); glycerine, 4 fldr. (15.55 gram.); simple syrup, 8 fldr. (31.10 gram.); sweet spirits of nitre, 10 fldr. (38.87 gram.); oil of sweet orange or of anise, 20 drops.

*Parthenicine.*—C. J. Ulrici,<sup>6</sup><sub>Jan. 22</sub> describes parthenicine, the alkaloid of parthenum hysterophorus, which, administered in doses of 0.05 gram. ( $\frac{3}{4}$  grain) every hour, appeared to have the power of relieving neuralgia, and in doses of 1 gram. (15 grains) a day cured a case of intermittent fever.

*Peganum Harmala.*—Paudurel<sup>50</sup><sub>Sept. 15</sub> has experimented with a tincture and an infusion of the seeds of peganum harmala and has discovered decided emmenagogue qualities, though a slight intoxication similar to that of hasheesh is also produced.

*Pengawar Djambi*—*Paku-Kidung.*—B. Reber<sup>54</sup><sub>Nov. 4, '97</sub><sup>80</sup><sub>Mar.</sub> gives some account of this substance and writes in favor of its very powerful hæmostatic action. An editorial article<sup>80</sup><sub>Apr.</sub> speaks of it as having long been used in the physiological laboratory of the University of Pennsylvania to check hæmorrhage during experiments on animals. As it is free from irritant properties, the writer recommends it to the consideration of surgeons. K. A. Norderling<sup>59</sup><sub>Oct. 30</sub> also quotes from the literature of this drug to show that it is in no sense a *new* hæmostatic, but was used to promote coagulation years ago.

*Petroleum*—*Gasoline*—*Vaseline*—*Litholeine*—*Coal-Tar.*—In contrast to the great praise bestowed by various authors last year upon *vaseline* as a vehicle for hypodermic medication, J. Roussel<sup>24</sup><sub>Mar. 25</sub> states that it is not a suitable substance for injection, as it remains

encysted in the tissues, and really prevents, to some extent, the absorption of the drug dissolved in it. It may even prove toxic, by taking nitrogen from the tissues and becoming hydrocyanic acid. That the insoluble forms of mercury suspended in vaseline and injected hypodermically have not proved harmful is because the vaseline surrounding the particles prevents the access to them of the chlorine in the tissues, and their consequent conversion into soluble sublimate. Balzer and Klumpke,<sup>24</sup> also, speak of the lack of absorption of vaseline and of its hindering the assimilation of the drugs combined with it. G. Grandmont,<sup>24</sup> on the other hand, is quite assured of the absorption of medicaments dissolved in vaseline, having tried them all. They give much less pain in this way than when in aqueous solution. Williams<sup>109</sup> reports a case of ulcerated growth of 12 years' standing, apparently epithelioma, cured rapidly by the daily application of *gasoline* by the patient. Another writer,<sup>109</sup> in commenting on this, refers to an instance of what was pronounced by good authority to be a cancerous growth of the nose, cured by the daily application of *petroleum* on a piece of cotton-wool. J. M. Muselli<sup>188</sup> has employed a preparation of *coal-tar* in small-pox, applying it three times a day on all the regions of the body exposed to the air. He has never seen any pocks on patients whom he has treated in this way. Noël,<sup>55</sup> <sup>9</sup> reports the advantages of *litholeine* as a distillation product from petroleum. It is a neutral, oily, yellow liquid, free from fats and resins, and without odor or taste. It has proved itself useful as a substitute for solid and liquid vaseline. It has both antiseptic and antiparasitic properties, and has been used with the best results in eczema and parasitic diseases. Another writer<sup>220</sup> also speaks highly of it in cutaneous affections, especially of a parasitic nature.

*Phenacetine — Acetphenitidine — Para-Acetphenitidine.* —

Phenacetine has received increased attention during the past year, and bids fair to prove a dangerous rival of the older antipyretics. Dujardin-Beaumetz<sup>6</sup> remarks that there are 3 acetphenitidines: the meta-, para-, and ortho-acetphenitidine. Of these the last 2 alone are of value; the ortho- being somewhat weaker than the para-salt—the one usually employed. They are excellent antipyretics and analgesics, and should be substituted for antipyrin because they are non-toxic, cheaper, require a smaller dose, and

are not the property of a monopoly. Gaiffe<sup>87</sup><sub>July 30</sub> publishes the same conclusions elsewhere, and reports an instance of vomiting checked by the drug and another of nervous polyuria relieved while it was being administered. Numerous writers speak of the *antipyretic* action of the drug. H. Hoppe<sup>116</sup><sub>Apr.</sub> has made a long series of clinical experiments with it and finds that in doses of 0.25 to 0.5 gram. ( $3\frac{1}{2}$  to  $7\frac{1}{2}$  grains) it is a powerful antipyretic, generally without unpleasant or dangerous results. In asthenic individuals, however, and especially in phthisis, it is to be used with caution. A. Huber<sup>214</sup><sub>Nov. 18</sub> <sup>19</sup><sub>Nov. 17</sub> has used it as an antipyretic, giving it usually in 15-grain (1 gram.) doses once a day. In several cases he found it effective after antipyrin had failed to reduce the fever, and he considers it superior to this drug in lowering temperature. Apyrexia began in a few hours with profuse perspiration. There were no disagreeable sensations produced, and collapse and vomiting did not occur. Pesce<sup>14</sup><sub>May 30</sub> also, has found its action in fever very satisfactory, 0.5 gram. ( $7\frac{1}{2}$  grains) producing a slow fall of temperature of several degrees, attended by a condition of euphory, though there is considerable perspiration. The drug is also a powerful antirheumatic. Heusner<sup>116</sup><sub>p. 108</sub> considers that 1 gram. (15 grains) of phenacetine acts as powerfully as 0.5 gram. ( $7\frac{1}{2}$  grains) of acetanilid or 2 gram. (30 grains) of antipyrin. The temperature goes down rapidly, usually with sweating, in 3 hours reaches its minimum, and then slowly rises again. Cesari and Burani<sup>87</sup><sub>June 18</sub> conclude from their experience with it that phenacetin may be used in all cases where it is desired to combat elevation of temperature, and that its action is analogous to that of the other chemical antipyretics usually employed. The drug is liable to produce more or less profuse sweating, but they have never observed collapse or chill. It is excreted in the milk of nursing women. C. W. Suckling<sup>2</sup><sub>Apr. 30</sub> has not observed rigors or other disagreeable effects after the drug, given in dose of 5 to 10 grains (0.32 to 0.64 gram.). He considers it fully equal to antipyrin, and much safer though less powerful than acetanilid. Mays, too,<sup>9</sup><sub>Aug. 20, '87</sub> <sup>80</sup><sub>Oct.</sub> concludes that it is safer, though slower in its action, than antipyrin or acetanilid. R. Lépine<sup>3</sup><sub>Dec. 21, '87</sub> <sup>116</sup><sub>Apr.</sub> claims that acetanilid has certain advantages over antipyrin, but that phenacetin in its turn is to be preferred to the former on account of being much less dangerous. In doses of 3 to 4 grains (0.19 to

0.26 gram.) a day it has no effect on the heart, and does not produce cyanosis nor any other unfavorable symptom, with the exception, perhaps, of perspiration. L. Roe<sup>2</sup><sub>Nov. 22</sub> has found it to act admirably in 4 to 8 grain (0.25 to 0.51 gram.) doses, having greater and more prolonged effect than antipyrin, and producing no rigors, nausea, or vomiting. P. Guttman<sup>41</sup><sub>July 12</sub>, after  $\frac{1}{2}$  of a year's trial of phenacetin declares it a very powerful antipyretic, 0.5 gram. (7 $\frac{1}{2}$  grains) of which produces the same effect as 1 to 2 gram. 15 to 30 grains) of antipyrin. It has no unpleasant secondary effects, and only once has he observed slight shivering caused by it. J. Guéorguievski<sup>67</sup><sub>Nov. 20</sub> tested the antipyretic action of phenacetin in 30 cases of tuberculosis, typhoid and typhus fevers, acute rheumatism, pneumonia, erysipelas, acute angina, diphtheria, and pleurisy. The temperature curve began to descend in  $\frac{1}{2}$  hour after a dose of 0.2 to 0.3 gram. (3 to 5 grains); within 4 hours it had decreased 1 to 2 degrees; a gradual rise then began, but the former elevation was not attained for 6 to 8 hours after the administration of the drug. Small repeated doses had less effect than a single larger one. The frequency of pulse and respiration diminished *pari passu* with the temperature, with the exception of pulmonary diseases in which the respiration was unaffected by it. Perspiration was moderate; there were no unpleasant effects seen; the quantity of urine was increased. The drug has no specific action on febrile diseases. Its antipyretic influence was most marked in phthisis, and least so in articular rheumatism. Misrachi and Rifat,<sup>67</sup><sub>Jan. 15</sub>,<sup>80</sup><sub>Oct.</sub> point out the fact that the drug is soluble in a warm solution of lactic acid, and hence the gastric secretion can dissolve it. It is less toxic than antipyrin, and much less so than acetanilid. In intermittent fever less perspiration follows it than the other antipyretics. To keep down the temperature in phthisis it is necessary to give about 4 grains (0.259 gram.) every 3 hours. It may be administered continuously for months without any unpleasant symptoms, but seems to lose somewhat of its effect. Grenfell<sup>15</sup><sub>Nov.</sub> reports 10 cases in which it was successfully given in 5-grain (0.32 gram.) doses for pyrexia. This action usually begins within  $\frac{1}{2}$  hour, the patient generally perspiring freely and feeling drowsy. The most satisfactory dose for an adult is 8 grains (0.518 gram.). Rumpf,<sup>4</sup><sub>Jan. 4</sub>, after reporting numerous cases of various affections treated by phenacetine, concludes from these that

it is an antipyretic of very certain action, and unaccompanied by unpleasant secondary effects. The dose for adults is 0.5 gram. ( $7\frac{1}{2}$  grains) and for children 0.2 to 0.25 gram. (3 to  $3\frac{3}{4}$  grains). It was usually accompanied by sweating, of which the patients often complained greatly. The apyrexia lasted 3 to 5 hours, and was followed by a rise of temperature, usually without chilliness, and never accompanied by rigor. The method of continual dosage was tried, but without much success, and the amount given needed to be constantly increased. It was without influence on the course of the febrile diseases in which it was employed except that it appears to have a specific action on rheumatism, since in 13 out of 23 cases it produced an immediate cessation of the fever, and within a few days of the articular pain and swelling. The development of endo- and peri- carditis, however, are no more hindered by it than by other drugs. The author considers it fully equal to antipyrin and acetanilid for all purposes for which these are employed, while it has fewer disadvantages than they. It is less apt than the former to provoke vomiting, and less dangerous than the latter, and only produces cyanosis rarely and when given in large doses. B. Rohden<sup>69</sup> says that the unpleasant effects witnessed after the use of the other antipyretics are entirely absent after the ingestion of phenacetine. He has observed no diuresis produced by it, and has used it extensively and with entire satisfaction in an epidemic of scarlatina and of measles. The dose for the smallest children was 0.15 to 0.2 gram. ( $2\frac{1}{2}$  to 3 grains), increasing with age to 0.7 gram. (11 grains) for adults. In one case of pneumonia he even gave 1 gram. (15 grains) without bad effect. In acute rheumatic arthritis he has had better results from doses of 3 gram. (46 grains) daily, than with salicylic acid and acetanilid. Zannas<sup>232</sup> has noticed a remarkable diminution of temperature after its administration, and Pérera<sup>232</sup> claims for it powerful antipyretic properties. W. Warfvinge<sup>370</sup> (communicated by Dr. Eklund, corresponding editor) gave phenacetine to 59 patients, most of them with febrile disorders. Although it is possessed of powerful antipyretic properties, it is not without the disadvantages of the other antipyretics. In acute rheumatism it is of about the same value as antipyrin and acetanilid, and much inferior to salicylic acid. F. Müller<sup>116</sup> has used phenacetine in erysipelas, typhoid and puerperal fevers, and in tuberculosis, with the result



of reducing the temperature to normal with a dose of 0.5 to 0.75 gram. ( $7\frac{1}{2}$  to 11 grains). Rarely was as much as 1 gram. (15 grains) needed. The fall of temperature occurred in 1 to 4 hours. Phenacetine has likewise been largely tested as an *analgesic and nervine*. A. Ott<sup>88</sup><sub>Oct.</sub> has used it as an antineuralgic, generally in doses of 0.5 gram. ( $7\frac{1}{2}$  grains). The results were brilliant in hemicrania and in occipital neuralgia. In pure trigeminal neuralgia it always gave relief, though but temporary, and it seemed to lose its effect. In a few cases of cardialgia and intercostal neuralgia the medicine was efficient, but in sciatica it was useless. The author is of the opinion that the drug loses its power more rapidly than acetanilid. Müller<sup>116</sup><sub>Aug.</sub> has employed it with satisfaction in relieving nerve-pains, as in the headaches of gynæcological and cardiac patients and in migraine; but doses of 2 to 3 gram. (30 to 46 grains) were often required. In chorea and for the pains of tabes it appeared to be useless. Hoppe<sup>116</sup><sub>Apr.</sub> considers it, in doses of 1 to 2 gram. (15 to 30 grains), useful in neuralgia, and especially in migraine. It requires 1 to 2 hours to produce its effect, but this is very certain, and usually is unattended by unpleasant symptoms. It is to be preferred to acetanilid on account of its greater harmlessness. Pesce<sup>14</sup><sub>May 20</sub> says that it may be given with success in neuralgias, migraine, and other irritated states of the nervous system. Cesari and Burani<sup>87</sup><sub>June 15</sub> deem it useful in pains of rheumatic origin. Heusner<sup>116</sup><sub>Nov. 10</sub> thinks its most important property is its sedative action on the nervous system. For this purpose he would prefer it to acetanilid, and has used it successfully in neuralgia, nervous excitement, and allied conditions. P. Guttmann<sup>41</sup><sub>July 12</sub> says that large doses act admirably in neuralgia and in the pains of rheumatism and tabes. Michaelis<sup>41</sup><sub>July 12</sub> has tried it in a series of cases of whooping-cough which had been unimproved by antipyrin, and observed in three instances a completely satisfactory result. Guéorguiévski<sup>586</sup><sub>No. 4</sub> has employed it for its powerful analgesic action, and agrees with those who say that it must be given in large doses. His results have been excellent in several cases of cephalalgia, sciatica, and tabes, but the headache of cerebral tumor was unaffected by its use. Rumpf<sup>4</sup><sub>June</sub> says that the dose of phenacetine as an antineuralgic should be 1 gram. (15 grains). In this character it is to be recommended in all cases of vasomotor neuroses, in the lancinating pains of tabes and the neuralgias of chronic neuritis, and

as a relief in other neuralgias of the most diverse forms. He considers it equal to antipyrin and acetanilid, to which he decidedly prefers it. Zadok,<sup>232</sup><sub>June 20</sub> and Nessim,<sup>232</sup><sub>June 20</sub> report good results with it in the relief of pain. Misrachi and Rifat,<sup>67</sup><sub>June 15</sub> consider its analgesic action most marked in neurosis of gastric origin, though it relieves pain connected with uterine and many other ailments. In migraine it seems inferior to antipyrin. It decreased the flow of urine in nervous polyuria and diabetes. A *topical action* of phenacetine is referred to by these authors, who state that applied locally in a case of cancer of the tongue it distinctly relieved the pain. Rohden,<sup>69</sup><sub>May 1</sub> too, besides reporting its value in migraine, says that it greatly hastened the healing of wounds when spread over them in the form of a powder. It will thus be seen that phenacetine is a very reliable antipyretic and nervine, and especially that it is comparatively safe. Apart from the considerable perspiration often produced by it, there seem, indeed, to be but few *unfavorable results* from it. Lindmann,<sup>116</sup><sub>June, Oct.</sub><sup>90</sup> publishes an instance in which 15 grains (1 gram.) of phenacetine given for migraine caused giddiness, flashes of light, trembling of the limbs, and nausea. Ten hours later a second dose produced a feeling of intense cold, cyanosis, cold perspiration, and dyspnoea. In this case antipyrin had previously caused vomiting. Warfvinge (report of Dr. Eklund, corresponding editor) gives an instance in which a papular eruption, lasting 3 days, appeared on the thorax, abdomen, and arms. He says also that excessive sweating is the rule, and that chilliness is frequently observed during the subsequent rise of temperature. Von Jaksch,<sup>113</sup><sub>No. 6, Oct. 18</sub><sup>99</sup> reports the case of a child in which  $\frac{1}{2}$  to 3 grains (0.032 to 0.20 gram.) were followed by profuse sweating, intense cyanosis, and collapse. Finally Müller,<sup>116</sup><sub>Aug.</sub> details 2 cases in which very large doses, 6 to 8 gram. (92 to 123 grains) daily, produced decided cyanosis, and an examination of the blood revealed the presence of methæmoglobin. During the last few months I have used phenacetine extensively as an antipyretic and analgesic. Though not as yet prepared to report in full, I can confirm the statements regarding its value from both points of view. It would seem to be the equal of antipyrin and acetanilid, but probably not superior to them.

*Phosphoric Acid.*—Grossich,<sup>220</sup><sub>Feb. 24</sub> has employed phosphoric acid in a dilution of 10 in 100 in the treatment of ulceration. He

claims that recovery always takes place in some days, though in tuberculous ulceration hypodermic injections of it are also to be recommended. Tuberculous affections of the large joints are also said to have been cured by it.

*Phosphorus*.—Comby<sup>80</sup><sub>Am.</sub> has treated 40 cases of rickets with phosphorus in cod-liver oil, but with by no means so good results as in 40 other patients who received salt bathing.

*Photoxylin*.—O. Rosenthal<sup>116</sup><sub>Am.</sub> gives his experience with photoxylin used as a substitute for collodion. Iodoform, sublimate, and pyrogallie acid mix readily with its solution in alcohol and ether. For microscopic purposes it may be used in place of collodion, as it is more transparent than it. E. O. Otis<sup>99</sup><sub>Am.</sub> commends the 5 per cent. solution of photoxylin in equal parts of ether and alcohol as a valuable agent in plastic and minor operations. It looks like collodion but is more persistent and adhesive, is entirely impervious, and exercises more uniform compression of the tissues.

*Phyllanthus Niruri*.—Amadeo<sup>744</sup><sub>V.18,p.908</sub> directs attention to the tincture of this plant, which he has used successfully in the treatment of intermittent fevers, 2 drachms (7.77 gram.) being given in the mornings. The plant has been used in India as a diuretic in gonorrhœa and acidity of the urine. The milky juice has been used as a healing application in offensive sores.

*Phytolacca Decandra*.—Collamore<sup>139</sup><sub>Pa.</sub> confirms the favorable opinion of others as to the value of poke-root in mastitis. He recommends 10-minim (0.64 gram.) doses of the fluid extract, pushed until the inflammation begins to subside. It may also be applied to the painful mammæ.

*Pichi*.—*Fabiana Imbricata*.—P. Green<sup>80</sup><sub>Am.</sub> has used the fluid extract of pichi in doses of 15 to 60 minims (1 to 4 gram.) t. d. in cases of uric acid diathesis, renal and vesical calculi, excess of phosphates, and catarrhal conditions of the urinary tract. He reports several cases benefited by it. It seems to be contra-indicated in renal disease, where destruction of tissue and degenerative changes have taken place, and it should, therefore, not be given in albuminuria. J. H. Tressel<sup>80</sup><sub>Am.</sub> gives notes of several cases of cystitis or other conditions producing severe pain on urination, all of which yielded to the treatment with pichi in full and frequently repeated doses. J. W. Southworth<sup>202</sup><sub>Aug. 25</sub> reports a case of vesical catarrh which shows that the drug is of use in this affection,

though it did not produce a complete cure. He has obtained good results with it in derangements of the alimentary tract, and has never yet failed to increase the appetite with doses of  $\frac{1}{2}$  to 1 teaspoonful before meals. T. Ivy<sup>202</sup><sub>Sept. 10</sub> has been well pleased with it in a few cases of irritation of the urinary apparatus, and J. G. Biller<sup>202</sup><sub>Feb. 25</sub> has used it in 8 cases of vesical disorder, but has obtained no certain benefit with it. The patients complained greatly of the taste, which he has been unable to disguise.

*Picric Acid*.—A. Golovina<sup>61</sup><sub>Mar. 3</sub> tried 0.03 gram. (0.462 grain) pills of picronitrate of ammonia 4 times a day in 7 cases of malarial fever of quotidian type. In 5 of these the medicine was promptly successful, the quinine treatment having been previously tried in 3 of them without avail. In 1 of the unsuccessful cases quinine later effected a cure.

*Pinus*.—P. James<sup>6</sup><sub>Mar. 10</sub> calls attention to the oil of mountain pine (ol. pini pumilionis), called also "pumiline." This is a refined product from the formerly celebrated Hungarian balsam. Sprinkled or sprayed about a sick-room it produces a fragrance which is not oppressive and seems to be a disinfectant. The oil is well adapted for inhalation, 10 to 20 drops being put into any steam inhaler. The same oil is also heartily recommended by G. Foy<sup>22</sup><sub>Feb. 25</sub> who employed it with remarkable success in a case of aphonia from overstrain of the voice. Five drops on sugar, q. d., restored the voice very rapidly.

*Pix (Tar)*.—Murrell<sup>2</sup><sub>Mar. 3</sub> has used with much satisfaction the syrup of pix liquida in nearly 100 cases of chronic bronchitis and winter cough. Addition of a small quantity of apomorphia greatly enhances its value. C. Saint Marc<sup>24</sup><sub>Apr. 1</sub> has administered tar-water in a large number of cases, and considers it an excellent hæmodynamic. He claims that it will arrest the hæmoptysis of tuberculosis more surely and promptly than any other means, and that it is a valuable remedy in uterine and renal hæmorrhage, and in that of pulmonary congestion. The dose employed was 40 to 60 gram. (10 to 15 drachms) in every 24 hours.

*Plantago Psyllium*.—Langlebert<sup>26</sup><sub>Aug. 1</sub> has recommended the seeds of this plant in preference to linseed for internal administration, since it yields its mucilage more readily to cold water, is more quickly acted on by the saliva, and is even partly digested by the gastric juice. The administration of the whole seeds

affords a supply of mucilage throughout the whole alimentary canal, and a very prolonged action of the mucilage may be obtained in this way.

*Potassium*.—Potassium hydrate in the form of the solid stick was used by C. H. Williamson<sup>6</sup> in a case of ulcer tending to spread over the eyeball, with the result of checking the course of the disease. Some articles concerning potash have come to hand, relating instances of toxic symptoms following the ingestion of the chlorate. Lenhartz<sup>306</sup> <sup>51</sup> <sub>Vol. 27, No. 4, Sept.</sub> cites a case which confirms him in the opinion that chlorate of potash in toxic doses acts upon the blood and produces methæmoglobin. There was here no gastritis nor hepatogenous icterus, but an enlarged spleen, cyanosis, and yellowish-brown particles and conglomerations, with large amounts of iron in the urine, evidently the results of destructive blood changes. The salt had been employed merely as a gargle. A. F. Fuchs<sup>50</sup> publishes the notes of a case of diphtheria in an adult who was using a 5 per cent. gargle of chlorate of potash and taking 3 small swallows of the same during 24 hours. After the fourth dose the urine became dark-red, and analysis showed the presence of blood. The patient was certain he had not swallowed more than a teaspoonful at a dose. H. G. Hill<sup>50</sup> relates an instance of a girl of 4 years of age who took one morning at least 80 grains (5 gram.) of chlorate of potash. By midday there was headache and loss of appetite, and by night-time high temperature, persistent vomiting, restlessness, and hallucinations. The next day she was still very weak, and there was marked pallor of the face. The author calls attention to the fact that during convalescence the skin became unusually clear and transparent, though it had appeared quite muddy previously.

*Potassium Nitrite*.—(See *Nitrites*.)

*Potassium Iodide*.—(See *Iodine*.)

*Potassium Permanganate*.—(See *Manganese*.)

*Pyridin*.—Relemen<sup>26</sup> found the vapors of pyridin give great relief in 19 cases of asthma. Its most beneficial effects were seen in cardiac and nervous cases. In emphysema the amelioration lasted from 8 to 12 hours. Half a drachm (1.94 gram.) or so of the liquid pyridine should be allowed to evaporate at a little distance from the patient.

*Pyridin Tricarboxylic Acid*.—S. Brzozowski<sup>279</sup> has employed

this substance in typhoid fever, giving 10 grains (0.64 gram.) in solution every 3 hours, and never with any unpleasant effects. It is agreeable to the taste and the stomach retains it. In pneumonia, too, he believes that it is preferable to the older remedies for reducing the temperature. In septic puerperal cases he has given 10 grains (0.64 gram.) every 3 hours with satisfactory results.

*Pyrodin.*—Dreschfeld<sup>2</sup><sub>Oct. 30</sub> has made some experiments with the new antipyretic, pyrodin, and finds that it acts much more quickly and powerfully than antipyrin, acetanilid, or phenacetine. In doses of 8 to 12 grains (0.51 to 0.77 gram.) it reduced the temperature within a few hours and kept it down for 6 to 8 hours. A rise then occurred, to be followed by a second fall, so that rarely more than one dose was required in 24 hours. It produces marked perspiration, but no nausea, collapse, or vomiting. Its antipyretic power was marked in various febrile diseases in which he tried it, and it acted well in cases of migraine, even when antipyrin failed. Given in repeated doses, however, it was apt to produce toxic effects. These consisted in the development of jaundice due to commencing hæmoglobinæmia.

*Pyroligneous Acid.*—Weil<sup>385 90</sup><sub>Mar., Oct.</sub> recommends the treatment of chronic pharyngitis by brushing the mucous membrane twice a week with the crude acid. There is a momentary burning sensation and an unpleasant taste, which soon disappears.

*Quillaia (Sapotoxin).*—Pachorukow<sup>13</sup><sub>Ed., 1910, No. 7</sub> concludes that from a therapeutical stand-point, the preparations of quillaia are better borne by the patient than the same strength of senega. They seldom produce vomiting or diarrhœa, and their power as expectorants is beyond a doubt. Trechinski<sup>80</sup><sub>Oct.</sub> finds powdered quillaia-bark of great service in acute and chronic rhinitis. It should be used as a snuff every few minutes until the nose becomes dry.

*Quinine.*—(See *Cinchona*.)

*Quinolin.*—(See *Chinolin*.)

*Resorcin.*—J. Andeer<sup>462</sup><sub>p. 100</sub> gives the results of his experience with resorcin during 10 years. Moulded with cacao-butter into convenient forms, he considers it a valuable antiseptic for the treatment of wounds. As a resorcin-soap its action is brilliant in sycosis, lichen, alopecia, eczema, condylomata, and parasitic affections. Other cutaneous disorders also recover under its employment. The remedy has no odor, does not produce burning if

used in proper concentration, and does not injure the healthy skin. For the disinfection of the genital tract it may be used with cacao-butter, or, still better, in aqueous solution. Its combination with vehicles should usually be that of 1 per cent. Internally, the author has given it with the best results in diseased conditions of the intestines, for which purpose it should be administered in keratinized pills. E. Mackey,<sup>6</sup> after reviewing the history, composition, and chemical affinities of resorcin, tabulates 17 cases of gastric ulcer or catarrh, in most of which he obtained very good results by the internal administration of 5 grains (0.32 gram.) three times a day. He considers its action analogous to that of carbolic acid and creasote, while it does not cause pain, vomiting, or constipation. In a few instances, where giddiness was possibly due to it, he lessened the dose to 3 grains (0.2 gram.). T. Maxwell,<sup>6</sup> describes a case of chronic painful ulceration of the tongue unrelieved by other treatment, in which a minute quantity of the drug sprinkled on the diseased surface reduced the swelling and almost entirely removed the pain, and Frohnstein,<sup>9</sup> states that it is an excellent means for the relief of tubercular ulceration of the larynx. Ten to 20 per cent. solution should be applied with a brush, and besides this a 2 per cent. solution should be inhaled several times daily. W. C. Chapman<sup>27</sup> writes of the antipyretic power of resorcin, having on several occasions used it in various febrile affections, and found it efficient after other antipyretics had failed. The fall of temperature was 2 to 3 degrees in about an hour after taking it. The dose for adults is 1 to 2 scruples (1.3 to 2.6 gram.), and for children 5 to 10 grains (0.32 to 0.64 gram.). He thinks that it disorders digestion less than the other antipyretics.

*Rhamnus Catharticus*.—E. C. Rothrock<sup>176</sup> finds the expressed juice of the berries of *rhamnus catharticus* very useful in rheumatism, especially when combined with *cimicifuga racemosa*. It is also a useful adjuvant to other diuretics and cathartics, and it is beneficial in all kinds of dropsy, though, of course, not curative in all. It may be combined with other drugs as the symptoms indicate. In the treatment of habitual constipation it stands next to *cascara sagrada* in value, and superior to other remedies.

*Rhamnus Frangula*.—A. Hutchins<sup>157</sup> appears to prefer the *rhamnus frangula* to *rhamnus purshiana* (*cascara sagrada*) on the

ground that it is equally powerful and more readily obtainable. He claims that *rhamnus* is an alterative and in no sense a cathartic. It regulates perverted secretion. It should be administered with glycerine and a carminative, at the same time with the food at the regular meals. T. M. Rochester<sup>157</sup><sub>Feb.</sub> has found the ordinary buckthorn (*rhamnus frangula*) more satisfactory than *cascara sagrada* (*rhamnus purshiana*), but even this has been disappointing in his hands when used as a laxative for habitual constipation, and he has mainly employed it as an aperient or cathartic. Gretchinsky<sup>745</sup><sub>Feb.</sub><sup>25</sup><sub>June 20</sub> recommends buckthorn as a reliable means of mitigating such dental pain as depends on inflammation of the pulp, but less effective where there is suppuration or sloughing. The decoction was used, and the patients told to wash the mouth with it every 3 or 5 minutes until the pain had disappeared. A plug of cotton-wool saturated with the fluid was placed in the cavity of the tooth when this existed.

*Rhamnus Purshiana*.—(See *Cascara Sagrada*.)

*Ricinus* (*Castor-Oil*).—The toxic power of the castor-oil bean is again shown by a case reported by A. L. Hodgdon.<sup>104</sup><sub>Dec. 21, '87</sub> It was that of a colored woman who had by mistake eaten  $\frac{1}{4}$  of a bean, which produced violent vomiting and purging; relieved by the administration of opium.

*Rochelia Virginica* (*Beggar's Tick*).—E. C. Rothrock<sup>176</sup><sub>May</sub> has for years used the infusion of the root of *rochelia virginica* for acute and chronic diarrhœa, dysentery, and diseases of the urinary organs. It also forms a good local application in the shape of a poultice for bruises, burns, and sprains.

*Rosa*.—M. G. Sokoloff<sup>1202</sup><sub>No. 10, Nov.</sub><sup>109</sup> considers the aqueous infusion of the root of *rosa canina*, or rose-briar, an excellent astringent, especially suitable for summer diarrhœa, and Tchiglovski<sup>1202</sup><sub>No. 10</sub> has tried the infusion in 4 cases of diarrhœa with good results.

*Rhus*.—G. A. Mueller<sup>19</sup><sub>Oct.</sub> has had several cases of diabetes insipidus cured by the use of *rhus aromaticus*. Another species, the *rhus chionanthus*, he considers the most promising remedy he has ever used in jaundice, especially in that in infants.

*Rubidium*.—S. Botkin<sup>586</sup><sub>No. 16, July 16</sub><sup>87</sup> tried the chlorates of rubidium and of cæsium in 10 cases of disturbed cardiac compensation. They produced an improvement in the pulse and in the general condition, but their action was feeble, especially in severe cases.



No disagreeable effects were observed. The dose given of the rubidium salt—which is stronger than that of caesium—was 0.35 gram. ( $5\frac{1}{2}$  grains) 5 times a day.

*Saccharin.*—There still exists a decided difference of opinion as to whether saccharin shall or shall not obtain a permanent place among useful drugs, and as to whether or not it has any injurious action on the economy. The greater number of writers certainly express themselves in its favor. Mercier<sup>24</sup><sub>Apr. 22</sub>,<sup>224</sup><sub>May 26</sub> concludes that it is innocuous to man, and may be given in large doses without functional derangement. For diabetics the neutral soluble saccharin is preferable to the mixture of saccharin with alkaline carbonates. E. Warren-Bey,<sup>6</sup><sub>Nov. 2</sub> writes of a patient with diabetes who has, he claims, been nearly cured by the administration of saccharin alone. Worms,<sup>3</sup><sub>July 4</sub>, on the other hand, gives notes of four patients with diabetes who used it, but who were obliged to discontinue it on account of the nausea, epigastric weight, and anorexia which it produced. He quotes Pavy, too, as saying that diabetics to whom he had given it were almost all forced to abandon it after a few days on account of the disorder of the stomach engendered. F. W. Pavy,<sup>6</sup><sub>Nov. 2</sub> however, says that Worms misunderstood him, as he has never known any dyspeptic troubles to be occasioned by its ingestion, and would freely recommend its employment. Dujardin-Beaumetz,<sup>3</sup><sub>July 4</sub> thinks it renders great service to the small number of diabetics who are unable to do without something in the place of sugar. Eichhorst<sup>34</sup><sub>July 10</sub>,<sup>5</sup><sub>Sept.</sub> finds it of value in the treatment of diabetes, but warns against its administration in too large quantities, as it produces an unpleasant after-taste, nausea, and disgust for the medicine. J. Hedley,<sup>2</sup><sub>Feb. 11</sub> relates a case illustrating one of the objections to the drug. A diabetic patient, to whom it had been given in place of sugar, began after 12 to 15 doses to suffer from nausea and such a persistent and intensely sweet taste in the mouth that its use had to be abandoned. The patient was even compelled to give up smoking on account of the sweet flavor of the smoke. The greatest intensity of the sweetness was experienced on the 5th day after the ingestion of the substance was commenced. It is probably best, therefore, to allow occasional intermissions in the administration of saccharin in certain cases. Kohlschütter and Elsasser<sup>326</sup><sub>V. 41, p. 178</sub>,<sup>19</sup><sub>Feb. 13</sub> also relate an instance of a diabetic patient who complained of a persistent sweet taste, so

disagreeable that there arose a disgust for food. To the lessened amount of nourishment taken in consequence was probably due the decrease in the amount of urine and sugar excreted. Pollatschek,<sup>97</sup> recommends the mixture of 36 parts of saccharin with 64 parts of quinine—the chininum saccharinum of Fahlberg. In this way the taste of the quinine is entirely concealed. When a liquid form is preferred, the quinine may be rubbed up with a solution of saccharin, and the emulsion quickly swallowed. A strongly dissenting voice is raised by J. W. Graham,<sup>44</sup> whose opinion is that only by a stretch of imagination can saccharin be considered to shorten the taste of quinine, and that it in no degree disguises it. A. H. Smith and B. F. Hayes,<sup>2</sup> have compounded a saccharate of quinine, containing 45 per cent. of the base, the taste of which is less disagreeable than that of other salts of the base. H. Haike,<sup>66</sup> does not believe that saccharin is of any great value in disguising bitter drugs. As an article of diet he considers it very useful, both in the treatment of diabetes and of obesity, and describes a bread sweetened with it and containing but little flour. As an antiseptic drug he has employed it successfully in the treatment of cystitis, using a solution of 3 gram. (45 grains) saccharin; 230 gram. (3 7 3 3) distilled water; 60 gram. (3 2) rectified spirits as an injection. Another recommendation of saccharin as an antiseptic comes from Little,<sup>16</sup> who reports favorably on it in six cases with ammoniacal, putrid urine, from different causes. He has not found it disturb the stomach, being superior in this respect to other drugs used to improve the condition of the urine. Mercier,<sup>24</sup> also, says that, taken internally in doses of 2 to 5 gram. (30 to 77 grains) in cachets, it may cause a diminution of or disappearance of pus from the urine in cystitis. C. Paul,<sup>3</sup> considers it a very valuable antiseptic for the alimentary tract. A teaspoonful of a 6 per cent. alkaline solution put in half a tumblerful of water forms a good antiseptic mouth-wash. The same strength solution may be employed for lavage of the stomach in putrid dyspepsia, dilatation, and cancer. C. Fahlberg<sup>74</sup> says that saccharin is used by the manufacturers of glucose and beet-sugar. The addition of a trifling quantity of it to either of these sugars makes them the equal in sweetness of the finest cane-sugar, while superior to it in digestibility and healthfulness. A writer<sup>80</sup> found that 1 drachm (3.88 gram.) of saccharin heated

to a solution in 1 pound (497 gram.) of glycerine made a convenient mixture for sweetening. A convenient method for dispensing the drug <sup>31</sup> is: saccharin, 24 grains (1.55 gram.); bicarbonate of soda, 12 grains (0.777 gram.); rectified spirits of wine, 1 fluidrachm (3.88 gram.); distilled water, 7 fluidrachms (27.21 gram.). Twenty minims equals 1 grain of saccharin, and is enough to flavor a 4-oz. (124 gram.) mixture. Another formula is that of Chamberlin, <sup>794</sup> who proposes the following as a reliable solution containing about 1 grain (0.065 gram.) in 20 minims (1.29 gram.): saccharin, gr. 80 (5.17 gram.); potass. bicarb., gr. 40 (2.59 gram.). Mix. Add glycerine, oz. 1½ (46.6 gram.); aq. destil., oz. 1½ (46.6 gram.). Melt gently in a water bath. Saccharin tablets have been recommended <sup>231</sup> containing sufficient of the drug to make them equal in sweetening power to a lump of ordinary white sugar. Enough alkali is added in their preparation to render them soluble. They are useful for the tea and coffee of diabetic patients. Another writer calls attention <sup>53</sup> to the value of saccharin in preparing emulsions, its advantages being that it does not diminish the fluidity of the mixture, and that it does not undergo fermentation. One grain (0.064 gram.) is sufficient for a 4-oz. (124.4 gram.) emulsion. The oil should be rubbed with the gum and saccharin in a dry mortar, and the water added in the usual manner.

*Salicylic Acid—Salicylates.*—The principal employment of salicylic acid during the year is for its action as an antipyretic, and, of course, for its specific influence on rheumatism. That the latter actually exists does not seem even yet to be universally admitted or indisputably proved. D. Hood, <sup>6</sup> has collected the records of more than 2000 typical stenic cases of acute rheumatism, somewhat more than half of which were treated with the salicylates, and analysis of these shows that the drug produced a loss of joint pain and fall in temperature, but that relapses were more common than under the older methods of treatment, and the patients were often left enfeebled. It appeared to have no effect whatever in preventing, reducing, or limiting the intensity of the cardiac lesions, and the mortality of the two sets of cases was much the same. Among those who, nevertheless, report excellent results with the salicylates in rheumatism is J. Hund, <sup>115</sup> who publishes 3 cases in which unusually prompt recovery followed the

administration of 3 doses of salicylate of soda, each containing 1 drachm (3.88 gram.) and given 3 hours apart. Aufrecht,<sup>69</sup><sub>Jan. 12;</sub><sup>90</sup><sub>Aug</sub> too, prefers salicylic acid to salol in the treatment of acute rheumatism. For its antipyretic action, R. M. King<sup>82</sup><sub>June 30</sub> gives salicylate of soda to reduce the temperature of typhoid fever when above 102° F. (38.88° C.), and believes also that it can take the place of quinine in many cases of malarial fever. Combined with quinine it is the safest of antipyretics. S. K. Jackson<sup>139</sup><sub>Mar</sub> claims that he has obtained good results from salicylate of ammonium in typhoid fever, and J. D. Sullivan<sup>139</sup><sub>Mar</sub> considers it an effective antipyretic, whose action is less rapid but more lasting than that of antipyrin or acetanilid. It should not be used in scarlatina, as it irritates the kidneys, and it must be employed with caution in typhoid fever, as there is danger of sudden failure of the heart. H. Huchard<sup>24</sup><sub>Jan. 15</sub> has used the salicylate of magnesia with success in typhoid fever, and claims that in doses of 3 to 6 gram. (46 to 92 grains) a day it has removed the ataxic and adynamic symptoms, and has decidedly lessened the mortality of cases under his charge. No bad effects were at any time observed, except some degree of ringing in the ears and vertigo. The diuretic power of salicylic acid has been tested by Huber<sup>328</sup><sub>Ed. 41</sub> in a series of cases of different diseases. In patients with pleuritis or with affections of the circulatory apparatus there was a decided diuretic action manifest. In typhoid fever, tuberculosis, and chronic nephritis, on the other hand, the drug had no such effect. J. Little<sup>16</sup><sub>Jan</sub> has had two years of the most favorable experience with salicylate of soda in the treatment of migrainous headache. If the patient wakes with any feeling of headache, he is directed to swallow 20 grains (1.3 gram.) of the drug, made effervescent by the addition of a dessertspoonful of the granular citrate of caffeine. A second, or even a third, dose should be taken, if necessary, at intervals of 2 hours. J. R. Lemen,<sup>82</sup><sub>June 30</sub> gives salicylate of soda in the uric acid diathesis, and Dufour<sup>1</sup><sub>June 9</sub> believes that in scleritis, due, as he believes, to rheumatism or gout, it is useless to employ local treatment, and that he has tried the internal administration of many different remedies, but without success until he commenced giving salicylate of lithine in 30-grain (2 gram.) doses. This was well borne by the stomach, and cured most of the cases. A. Haig-Brown,<sup>6</sup><sub>Jan. 15</sub> says that, while other acids diminish the excretion of uric acid, salicylic acid and

its salts do not have this effect; further, that acids given while salicylates are present in the circulation have no longer the power of diminishing the excretion of uric acid. L. E. Holt, as well as W. H. Katzenbach,<sup>1</sup><sub>July 28</sub> use salicylate of soda in amygdalitis with success. Randall,<sup>9</sup><sub>Apr. 7</sub> reports the case of a child of 11 years who voided 9½ pints of non-saccharine urine in 24 hours. Under the administration of 8 grains (0.52 gram.) of salicylate of soda after each meal marked improvement began and continued. Other remedies had been tried unavailingly. The proper dose of salicylic acid is discussed by F. H. Alderson,<sup>77</sup><sub>Feb.</sub> who determines that 10 to 15 grains given every 4 hours is a perfectly safe amount. H. Woods,<sup>104</sup><sub>Feb. 25</sub> reports 3 very interesting cases of hallucination caused by the ingestion of salicylate of sodium, and Jaccoud,<sup>24</sup><sub>May 18; July 80</sub> says that the salt may actually produce or increase delirium in typhoid fever, and that it is important to remember this fact in carrying out antipyretic treatment with it. As a topical application, Ory,<sup>24</sup><sub>June 17; Aug. 15</sub> uses salicylic acid for a very vigorous treatment of his cases of sore throat of a diphtheritic type. At least 3 times a day he thoroughly cleanses the mouth and pharynx by firm washing with a large brush wet with a 1 to 350 aqueous solution of it, and believes that the early destruction of the patches which on these occasions may prevent a systemic infection. H. C. Fairbrother,<sup>82</sup><sub>June 20</sub> also, has repeatedly had the best results from the topical employment of salicylic acid in diphtheria. N. F. Penn,<sup>1</sup><sub>May 18</sub> treats ringworm by painting it once a day with a saturated solution of the acid in collodion. One application is usually all that is needed, and he has seen the treatment fail in only one instance. Binert,<sup>25</sup><sub>Jan. 30</sub> advises the following method of preparing salicylic collodion for the treatment of corns: Collodii, 100 parts; acidi salicylici crystal., 10; terebinthinæ venet., 1; chlorophyli, q.s.

*Salol.*—Salol continues to be used to some extent, chiefly as a substitute for salicylic acid. Dercum,<sup>242</sup><sub>Jan.</sub> uses it when the oil of gaultheria disagrees with the stomach, since he finds it perfectly bland and unirritating. It is slower in acting than the other salicylates, and the effect is not so pronounced. He has noticed that the ringing in the ears is less and the deafness greater than with gaultheria. He gives 15 to 20 grains (0.97 to 1.30 gram.) every 3 to 4 hours. Aufrecht,<sup>69</sup><sub>Jan. 15; Aug. 90</sub> prefers salol to salicylic acid in chronic rheumatism, as it is less apt to produce deafness and

tinnitus, and does not disagree with the stomach. It will also sometimes influence the disease favorably when the acid fails. In acute rheumatism he decidedly prefers the acid, at least for the first two days, after which he uses salol. J. R. Bradford<sup>99</sup><sub>July 19</sub> gives the results of his employment of it in 16 cases of rheumatic fever. In the severe cases 10 grains (0.647 gram.) were given every hour until the temperature fell. He concludes that the results were exactly those which would be expected from the salicylic acid which the drug contains. That deafness and tinnitus aurium is less than with the acid is because there is less of this ingested. Salicylic acid was also efficient in his hands in cases where salol rendered no service and was more useful in relieving joint pains. F. H. Köster<sup>372</sup><sub>p. 428</sub> (report of corresponding editor, Dr. Eklund, Stockholm) has employed it in rheumatic affections and considers it a remedy fully equal to the salicylate of soda. In the treatment of cystitis it is not surpassed by any other remedy. W. Mendelson<sup>1</sup><sub>July 22</sub> has used it with success in cystitis, and has also found it serviceable in amygdalitis, due probably to its influence upon the gouty and rheumatic diathesis. J. L. Montange<sup>35</sup><sub>No. 2</sub> considers the drug useless in typhoid fever and acute rheumatism. In subacute rheumatism doses of 2 to 4 gram. (30 to 61 grains) a day shortened the course of the disease. The remedy was also of service in ataxia, paralysis agitans, and other painful affections of the nervous system. Oliver<sup>6</sup><sub>May</sub> has not succeeded in reducing the high temperature of phthisis with salol, nor the amount of pus in cystitis and pyelitis. In rheumatism, however, his results have been most satisfactory, and often superior to those obtained with the salicylate of soda. He does not think it has perceptibly diminished the tendency to endocarditis. J. A. Wessinger<sup>60</sup><sub>Mar. 3</sub> reports 21 cases of fever of different sorts, in which it was used as an antipyretic, and concludes from them that in salol we have a simple, safe, and efficient antipyretic. It is not depressing, and is serviceable in the diseases of children on account of being less disagreeable in taste than other drugs. C. A. Church<sup>59</sup><sub>Mar. 3</sub> reports a case of herpetic eruption on the upper part of the trunk occurring in a case of typhoid fever, and caused, the author believes, by the administration of salol for two days. Demme<sup>650</sup><sub>No. 51, 77; July</sub><sup>80</sup> used it in children in a few cases of acute articular rheumatism, endo- and peri- carditis, and vesical catarrh. Although the effects in rheumatism were not very

prompt, yet there was no relapse, and the rheumatic process was decidedly shortened. In one case the remedy was not well borne by the stomach and produced, also, an urticarial eruption. The drug was apparently of advantage in the cases of vesical catarrh. J. Drzewiecki,<sup>59</sup> has made some experiments on the value of salol in pleurisy, and concludes that it is a more valuable remedy in this affection than the salicylate of soda, as it rarely produces buzzing in the ears and does not spoil the appetite. It must, however, be given in doses as large as 8 to 12 gram. (123 to 185 grains) a day. The employment of salol in intestinal disorders is reported by Eichberg,<sup>53</sup> who used it in 14 cases of diarrhœic diseases in children during summer. The results indicated that the drug could not be relied on. In the simpler forms of bowel trouble it seemed to act promptly enough, but the antiseptic effects soon passed off, and often rendered other remedies necessary later. He considers naphthalin much superior to it. On the other hand, O. T. Osborne,<sup>1</sup> has treated 22 cases of diarrhœa, most of them in children, with salol, with 19 reported cures and 3 not heard from. To a child of 2 to 5 years he gives 0.1 gram. (1½ grains) every 2 hours in acute diarrhœa until the stools cease. Another writer<sup>44</sup> also reports 10 cases of chronic diarrhœa and dysentery, all but 3 of which were cured by the use of salol after other means had been used faithfully but without effect. Salol has been used by Ewald,<sup>22</sup> for diagnostic purposes in diseases of the stomach. As it is not decomposed until it reaches the alkaline juices of the intestines, the time of appearance of salicylic acid in the urine depends on the speed with which salol has passed through the stomach, and is an index of the motor power of this organ.

*Saponaria*.—Blumenstadt<sup>126</sup> has employed the syrup of *saponaria officinalis* for regulating menstruation, and with a success which has surpassed his expectations. He considers that it acts directly on the uterus, but is entirely harmless. The dose is a tablespoonful 3 to 10 times daily, and this continued for from 4 to 5 days will usually produce the desired effect.

*Siegesbeckia*.—Hallopeau<sup>3</sup> has used the tincture of *siegesbeckia* locally in the treatment of *tinea tonsurans*, mixing it with an equal quantity of glycerine in the manner which has been advised by others. His results, however, have been entirely negative.

*Silica*.—(See *Flourine*.)

*Simulo*.—W. H. White<sup>6</sup><sub>Mar. 21</sub> has used *simulo*, the fruit of one of the hyssop family, in 7 cases of epilepsy, in doses of  $\frac{1}{2}$  to 2 drachms (1.94 to 7.77 gram.) of the tincture 3 times a day. In all the cases considerable improvement took place, though complete cure was attained in none of them. Eulenburg<sup>116</sup><sub>Aug.</sub> repeated the experiments of White, and administered the drug during a long period to 4 cases of epilepsy and 3 of grave hysteria, the dose being  $\frac{1}{2}$  to 2 teaspoonfuls 3 times a day. It proved itself absolutely useless in hysteria and of avail in only 1 of the epileptics. In this patient it diminished the number of paroxysms at the first, but afterward seemed to lose its effect and had to be abandoned. In the other 3 cases the drug was evidently inferior to the bromides in moderate doses.

*Sodium*.—Hesse<sup>4</sup><sub>May 7</sub>,<sup>9</sup><sub>July 7</sub> reports a case of diabetic coma temporarily improved by an intravenous injection of  $\frac{3}{8}$  (249 gram.) of a 4 per cent. solution of *sodium carbonate*. Baton<sup>220</sup><sub>Mar. 16</sub> recommends the use of *sodium chloride* in migraine. At the moment when the first symptoms are felt the patient should take  $\frac{1}{2}$  to 1 teaspoonful of table-salt dry, and wash it down with a swallow of water. He has tried this plan in 6 cases, in all of which the attack could be thus aborted or rendered very short. Basing his practice on the experiments of Cantani in cholera, L. Rosenbusch<sup>224</sup><sub>Jan. 2</sub> has used hypodermic injections of sodium chloride. In sudden collapse he injects 5 to 8 drachms (19.44 to 31.10 gram.) of a 6 per cent. solution. In paresis of the heart-muscle from any acute disease he gives 5 to 8 drachms (19.44 to 31.10 gram.) at once, and then 1 to 2 drachms (3.88 to 7.77 gram.) daily. In acute gastroenteritis or great weakness after severe vomiting and diarrhœa he gives subcutaneously 8 to 20 ounces (249 to 622 gram.) of a tepid solution of 6 in 1000. Hæmorrhage from the lungs or stomach demands an injection of 5 drachms (19.44 gram.), and then  $1\frac{1}{2}$  drachms (5.82 gram.) daily; while heart-failure in consequence of chronic disease and cachectic conditions should receive  $1\frac{1}{2}$  drachms (5.82 gram.) daily for several days. H. G. Piffard<sup>216</sup><sub>Jan.</sub> recommends immersion for from 15 to 20 minutes in a hot bath of a 5 per cent. solution of common salt, as being not only a source of great comfort in various cutaneous diseases, but of considerable therapeutic value. B. W. Richardson<sup>22</sup><sub>Sept. 12</sub>



says that his treatment of raised nævus with *sodium ethylate* has never failed to cure and has never been attended by unfavorable results. The surface of the nævus is dried and coated with the ethylate. In a few hours a scab forms. On the third day a needle with cutting edges is passed through it and used to break up the vascular surface beneath. Firm pressure is now applied, bleeding is controlled by styptic colloid on lint, a drop of ethylate inoculated through the opening, a new layer painted over the crust, and the crust left for another 4 days. The cure is now usually complete, but if not a repetition of the process is instituted.

*Sodium Benzoate*.—(See *Benzoic Acid*.)

*Sodium Fluosilicate*.—(See *Fluorine*.)

*Sodium Iodide*.—(See *Iodine*.)

*Solanin*.—Sarda<sup>99</sup><sub>May 3</sub> found solanin to be a very useful nerveine wherever a depressant action on the spinal cord was desired. To allay pain in old and rebellious sciatica and in obstinate neuritis it is superior to both antipyrin and acetanilid, and it is valuable in locomotor ataxia and in ulcer of the stomach; but it is especially in cases of motor agitation that the drug is of most service. In 2 cases of the epileptoid trepidation and fulgerant pains of chronic myelitis the result was rapid and constant, and the pains and tremor ceased, while in a case of disseminated sclerosis the trembling of the arm disappeared entirely after 6 days of treatment. The average dose is 0.25 to 0.30 gram. ( $3\frac{1}{2}$  to  $4\frac{3}{4}$  grains) a day in divided doses. Grasset<sup>99</sup><sub>May 3</sub> agrees with Sarda that solanin is adapted to combat the medullary symptoms produced by lesion of the lateral columns of the cord. In epileptoid trepidation and in the trembling of disseminated sclerosis it works wonders, though its effects are not very lasting. The high cost of the drug, 10 francs a gram. (15 grains), prohibits its general employment. Geneuil<sup>108</sup><sub>Feb. 15</sub> has used solanin with excellent results in the treatment of various neuralgias, 0.05 to 0.30 centigram. ( $\frac{1}{4}$  to  $4\frac{3}{4}$  grains) being given three times a day by the mouth, or a smaller amount hypodermically. It quiets the cough of bronchitis, and is, in fact, useful in all diseases where there is excitation, pain, or spasm. A. Capparoni<sup>669</sup><sub>1897; Feb. 25</sub><sup>67</sup> has found it very serviceable in idiopathic and symptomatic asthma. In patients having difficulty in walking as the result of acute myelitis, in clonic spasm, in paralysis agitans, and in headache solanin has in his hands acted satisfactorily.

*Souchus Aleracea*.—S. F. Landry <sup>121</sup><sub>July</sub> has made clinical experiments with *souchus aleracca* and finds the juice a powerful, drastic purge, resembling elaterium, when taken internally in doses of 2 to 4 grains (0.13 to 0.26 gram.). It gripes and produces tenesmus. Care must be used in its administration in order to prevent its too fierce action on the mucous membrane of the intestinal canal.

*Sozoiodol*.—M. A. Fritsche <sup>116</sup><sub>June</sub>, <sup>5</sup><sub>Oct.</sub> has used this substance, in combination with the bases sodium, potassium, zinc, or mercury, for the treatment of the throat and nose in 82 cases. The first two salts can be used pure, the zinc combination must be reduced  $\frac{1}{5}$  to  $\frac{1}{10}$ , and the mercury  $\frac{1}{10}$  to  $\frac{1}{20}$ . All were used as powder. Atrophic catarrh, ozæna, and pharyngitis sicca, were more benefited than by other applications, operative wounds healed more quickly than usual, and tuberculous ulcers showed a tendency to cicatrize. Bufalini <sup>477</sup><sub>May</sub>, <sup>90</sup><sub>Oct.</sub> has administered the drug to a considerable number of cases of phthisis, but has observed little alteration, although the dose was as much as 1.5 gram. (16 grains) per day. There were no toxic symptoms. L. Larmuth <sup>90</sup><sub>Oct.</sub> reports favorable results obtained with it in rhinopharyngitis and rhinitis, ozæna, and chronic purulent otitis. The sodium compound is used pure or in 3 per cent. to 10 per cent. solution. If a prolonged action is desired the potassium salt is applied either pure or mixed with talc or sugar. For insufflations they may be used undiluted, but the zinc and mercury compounds must be mingled with a considerable excess of milk-sugar. All the salts may be made up as ointments with lanolin.

*Sparteïn*.—Pawinski, <sup>520</sup><sub>Jan. 7, 14, 21, June 1</sub>, <sup>26</sup><sub>June 1</sub> made careful observations on the action of sparteïn on 33 patients. He says that the effect becomes pronounced in 30 to 40 minutes after taking the drug; that there is no cumulative action; that the increase of diuresis is slight; that there is no disturbance of digestion, and that only small doses should be employed. It is indicated in various functional cardiac disturbances observed generally in neurasthenic and anæmic subjects and in excessive smokers and drinkers, in cases of organic cardiac disease in which there are discomforting subjective symptoms, in initial stages of Grave's disease, in asthma, in patients suffering from emphysema and chronic bronchitis, and in cases in which digitalis is not tolerated. A. Maslowski <sup>80</sup><sub>Jan.</sub> concludes, as a

result of his trial of the drug in 3 cases of cardiac affection, that it is a powerful and rapidly acting heart tonic, and greatly increases the flow of urine. It has no cumulative or other unpleasant action. P. E. Livierato<sup>220</sup><sub>Feb. 24</sub> considers it a cardiac tonic and diuretic. C. Ferreira<sup>35</sup><sub>Feb. 3</sub> has had excellent results with sparteïn in some cases of disturbance of the cardiac action from functional or organic causes. While he does not regard it as equal to digitalis, it is nevertheless useful in cases in which the latter remedy is contra-indicated. S. V. Levascheff<sup>67</sup><sub>July 15</sub>; <sup>80</sup><sub>Sept.</sub> concludes, as the result of his studies with the drug, that it steadies the pulse and respiration, but is without effect when the heart-muscle shows evidences of degeneration or where œdema is very excessive. It is indicated in recent affections, where the heart-muscle is little affected and compensation not much disturbed. Its action is very rapid, 15 minutes being all that is required to exhibit this. A persistent effect is not gained with less than 2 to 5 grains (0.129 to 0.323 gram.) daily, but disturbances of the digestive tract are very apt to be produced by this amount. The drug is less active than digitalis, adonis, and strophanthus. A still more unfavorable opinion of it is that of Pawlow,<sup>546</sup><sub>Nov. 25</sub> who tried it in a case of Grave's disease and in several cases of valvular affections and of cardiac exhaustion. In most of them the drug was without action, and the author concludes that it is only indicated in those cases in which compensation is not yet disturbed.

*Stigmata Maidis (Corn-Silk).*—L. B. Anderson<sup>202</sup><sub>Aug. 25</sub> calls attention to the unpleasant symptoms which he has several times seen follow the administration of stigmata maidis. These consisted of a dizzy, drunken state, and were due, he believes, to an improperly prepared fluid extract of the corn-silk, since with other preparations he observed no such effects follow.

*Strophanthus—Strophanthine.*—Strophanthus has received careful study on the part of several investigators during the past year. Though the opinions expressed concerning it are still very varying, most writers appear to agree that it is by no means the equal of digitalis, and many have evidently been greatly disappointed in it. This has, in truth, been my own experience with it, though I have tried it in not a small number of cases. A. Fränkel<sup>41</sup><sub>Jan. 2</sub> gave the tincture of strophanthus to 22 cases, the majority of which were instances of valvular lesions. He concludes

that the drug is a valuable heart tonic, but in no way superior to digitalis. While the latter often proves efficient where the former has failed, he has seen no instance in which the reverse of this was true. In valvular lesions he has also frequently observed *strophanthus* lose its power in cases which it at first benefited. It appeared to be most serviceable in functional disorders of the heart, less so in valvular diseases, and entirely without influence in arteriosclerosis and nephritis. In no case did any favorable action appear in less than 24 hours after the commencement of treatment, and there was no especially favorable action on dyspnœa, but dyspeptic disturbances were observed in very few instances. One case of ascites from cirrhosis of the liver was entirely relieved by the use of the drug. P. Guttman<sup>41</sup> treated about 40 cases with *strophanthus* in order to determine (1) its power as a cardiac tonic ; (2) its ability to relieve dyspnœa, as in phthisis ; (3) its ability to remove effusions of fluid not depending on a cardiac cause, as in pleurisy. He concludes that it is a drug which acts upon the heart in some cases, but is unreliable, and not to be compared with digitalis. It had no effect in removing inflammatory effusions, but appeared sometimes to relieve dyspnœa in phthisis and emphysema. Besides this, it proved itself a very serviceable diuretic, although this action was not witnessed in all cases. Fürbringer and Hochhaus<sup>41</sup> treated 120 cases with *strophanthus* with very varying results, and there seem to be no definite indications for its employment. In only 30 cases was there a decidedly favorable action. Dyspnœa was only benefited in those instances in which a diuretic action of the drug was observed. In pure renal dropsy it had no diuretic power. By way of caution the author says that 3 of the 120 cases died suddenly and unexpectedly. The autopsy revealed no cause for this, while, on the other hand, it was in these cases that the drug had been used in large doses and throughout a rather long time. H. Grätz<sup>34</sup> finds that *strophanthus* is not seldom without action in valvular diseases, while it sometimes produces an immediate very marked improvement of dyspnœa, oppression, and sleeplessness due to insufficient cardiac activity. He has given it for this purpose, and with great success, to 15 cases of severe pneumonia, in all of which there were evidences of weakness of the heart. There was in every case a prompt improvement in the pulse after the administration of the remedy. The

usual dose was 10 drops of a 1 in 10 tincture three times a day. L. Rosenbusch<sup>4</sup><sub>xx</sub> concludes, from his experience in a number of cases of various kinds of heart diseases, as well as in many cases of renal affections, that strophanthus increases the force and duration of the cardiac systole, diminishes its frequency, strengthens the heart-muscle, and increases the arterial tension. It does not disturb digestion, and can be used for some weeks without evidence of cumulative action; it has diuretic power in diseases of the heart, but none in affections of the kidneys. It is less powerful than digitalis, but may be used with benefit to maintain the favorable action which has been obtained by the latter in cases of severe disturbances of compensation. It is, however, contra-indicated in stenosis of the aortic valves because it prolongs the systole. The alcoholic tincture is to be preferred to the ethereal, since it contains all the bitter glucosides of the plant. An unfavorable report of it comes from Gautier<sup>197</sup><sub>Jan. 29</sub> who tried the drug in large doses without the least result in a case in which digitalis always acted well. On the other hand, T. W. Shaw<sup>161</sup><sub>Jan</sub> has never found its action disappointing. In some cases it has been efficient where digitalis had failed. It has given the greatest relief in dropsical effusions with great dyspnœa of cardiac origin, and produces a copious flow of urine. Poulet<sup>97</sup><sub>Dec. 30, 97</sub> has used it with great success in 15 cases of scarlatinal nephritis; one of the chief advantages of the drug in nephritis being that it does not constrict the vessels and thus increase the resistance in them, as digitalis does. It has a well-marked action on the muscular system, and the author has consequently employed it with prompt results in several cases of local paralysis from cold or pressure. On account of its calmative influence on the circulation, he has used it satisfactorily against hæmorrhages from the nose, uterus, and lungs. It was also very serviceable as a cardiac stimulant in febrile affections. He administers the drug in pills, each containing 0.05 gram. ( $\frac{1}{2}$  grain) of the powder freshly made from the seeds. R. B. Wild<sup>80</sup><sub>Apr.</sub> gives an excellent review of our knowledge of strophanthus. He concludes, from the 200 to 300 cases which he has collated as instances of the employment of the drug, that it was usually of benefit in organic diseases of the heart, while in functional affections the result was more uncertain, the best results being obtained when the rhythm was markedly irregular. It was generally of service in heart-failure from fever

and in Bright's disease with cardiac failure. In diseases of the respiratory apparatus and in dropsy from abdominal diseases it was seldom of value. There appears to be no cumulative action possessed by it. *Strophanthus* and *digitalis* are rather allies than rivals, the former acting on the heart alone, the latter on the heart and the vessels. J. Aulde<sup>80</sup><sub>Jan. 14</sub> regards *strophanthus* as a useful drug for both aortic and mitral lesions, and deems it superior to strychnia in the treatment of fatty heart and for the weak heart in the latter stages of pregnancy. It is likewise to be employed as a heart tonic in pneumonia and typhoid fever. Huchard<sup>24</sup><sub>Jan. 1</sub> has used it in a number of cases, and found that while sometimes of value in cardiac diseases it oftener failed, and that, too, in instances where *digitalis* produced its usual good effects. He considers it a poison of peculiar power, to be used with caution. It is inferior to *digitalis*, but has the advantage of a more rapid action. E. G. Dutton,<sup>2</sup><sub>Jan. 21</sub> on the other hand, has given it with great advantage, especially in those cases in which *digitalis* seemed to be doing more harm than good. It has in several instances produced an intermittency of the heart's action, always relieved by increasing the dose. Sanders<sup>206</sup><sub>Oct. 27</sub> treated 15 cases of Asiatic cholera successfully with it. There was a quick recovery from the stage of collapse, with a cessation of the vomiting and a return of normal urination. Adults were given repeated doses of 10 drops. In one case of profound collapse it was administered at the rate of 1 drop of the tincture every 5 minutes for 4 hours, and then at the rate of 1 in 10 minutes. P. Snyers<sup>78</sup><sub>Jan. 14</sub> concludes from his trials of *strophanthus* in 30 cases that it increases the power of the heart-muscle, diminishes the frequency and increases the force and tension of the pulse, and augments diuresis in a remarkable manner. It only failed in cases of degeneration of the heart-muscle where *digitalis* and *caffein* were also useless. Luciani<sup>505</sup><sub>No. 99, 97</sub> says that in all cases in which he used the drug the heart's action became stronger and more regular, and there was a considerable increase in the secretion of urine. It did not disturb digestion. A. Rovighi<sup>2</sup><sub>Apr. 7</sub> comes to the conclusion that it is much inferior to *digitalis* and *caffein* in regulating disordered cardiac action, but he was impressed with the way in which it lowered temperature. Four to 6 minims (0.259 to 0.388 gram.) every 6 hours reduced the temperature of 4 cases of phthisis 2° to 3° C.

(3.6° to 5.4° F.). Other instances of tubercular disease and a case of typhoid fever illustrated its antipyretic action. In all these cases headache was relieved, the frequency of the pulse lessened, and the drug caused no collapse, sweating, or digestive disturbance. On the other hand, V. Martini <sup>2</sup><sub>Apr.</sub>, has carefully tested the alleged antipyretic power of strophanthus with absolutely negative results. He tried it in various affections, giving 10 to 50 drops daily in 3 or more doses. T. Jackson <sup>2</sup><sub>Apr. 28</sub> reports 2 cases of severe organic disease of the heart greatly benefited by tincture of strophanthus. He has also found it serviceable in functional cardiac derangements. G. R. Butler <sup>157</sup><sub>May</sub> has tested it with some care in pulmonary, cardiac, and renal cases. Gastric disturbance did not seem to be so apt to occur as after digitalis. He found it particularly adapted to pulmonary disease attended by cardiac weakness, to functional disorders, and to degenerative changes of the heart-muscle. In valvular affections it is especially valuable in mitral stenosis. Compared with digitalis it is more a cardiac stimulant than a cardiac tonic, as its effects are more evanescent. Moderate doses frequently repeated will give better results than larger ones at longer intervals. The author usually gave 3 to 14 minims (0.194 to 0.907 gram.) of the tincture every 2 to 6 hours. Spillmann and Haushalter <sup>184</sup><sub>Nov. 15</sub> made comparative tests with digitalis and strophanthus in 11 cases of heart-failure. In most of them digitalis was of service when strophanthus was not, though in 2 instances the reverse was true. An instance of toxic effects from the drug is published by H. Y. Evans, <sup>9</sup><sub>Jan. 16</sub> who records a case of a girl of 5 years to whom 20 drops of the tincture had been given by mistake. There was produced fever, a pulse of 140 in a minute, unusually forcible contraction of the left ventricle, slight systolic murmur over the mitral valve, quivering pupils, and loquaciousness. In sharp contradistinction to this is the opinion of D. G. Evans, <sup>6</sup><sub>Oct. 27</sub> who believes the new drug vastly superior to digitalis, especially in mitral disease. He has never found it make the heart-beat irregular or more rapid, even when given in large doses; nor has he witnessed any cumulative action. He reports 7 cases in which he has used it, and in some of these digitalis had previously been employed. T. L. Hatch <sup>105</sup><sub>Nov. 15</sub> reports a few cases illustrative of the value of strophanthus in relieving cardiac symptoms, and Lemoine, <sup>3</sup><sub>June 12</sub> has employed it in heart-disease, and has found it almost always increase

the secretion of urine, except when the heart had nearly reached a condition of asystole. The diuresis persists many days after the drug is withdrawn. Moncorvo and Fereira<sup>17</sup><sub>Oct. 25</sub> have in 6 cases witnessed the favorable effects of *strophanthus* as a cardiac stimulant, 2 of the patients being infants of little over a year old, and Collins<sup>60</sup><sub>Jan. 14</sub> records a case in which it acted most powerfully in reducing œdema. As regards the employment of *strophanthine*, Dujardin-Beaumetz<sup>3</sup><sub>Nov. 14</sub> advises against it, since there are at least 5 varieties of it, not including *strophantidin*. The tincture of *strophanthus* he considers a valuable remedy. Sée and Gley<sup>3</sup><sub>Nov. 14</sub> have given *strophanthine* in various diseases of the heart. Its action was especially favorable in mitral stenosis. It is contra-indicated in angina pectoris. It is not superior to *spartein* and is more toxic than the latter. Rothziegel and Koralewski<sup>650</sup><sub>v. 11, pp. 16, 22</sub> have used *strophanthine* in 44 cases, and found it valuable in strengthening and regulating the heart and thereby diminishing dyspnœa and increasing diuresis. Its action is not so prompt or certain as that of the tincture of *strophanthus*, but it seems less apt to disturb the stomach. My own experience with *strophanthus* has led me to place but little reliance upon it. While seeming to benefit in cases with symptoms of but little severity, in which, perhaps, rest in bed would have been sufficient in the way of treatment, it has again and again failed me in severe cases in which I have obtained good results from *digitalis*, and I cannot now call to mind a single instance in which it has proved of value after *digitalis* had failed to do good.

*Sulphur—Sulphides—Sulphites—Sulphurous and Sulphuric Acids.*—H. V. Knaggs<sup>82</sup><sub>May 26</sub> has found that the internal administration of 4 grains (0.259 gram.) of precipitated *sulphur* every  $\frac{1}{2}$  hour or oftener, continued for at least 5 days, answers well in diphtheria, except in those instances where the membrane has spread to the posterior nares. In these cases he uses insufflation also. H. G. de Mussy<sup>60</sup><sub>Feb. 16</sub> treats *sciatica* by spreading a thick paste of flowers of sulphur on a cloth, and wrapping the leg in this. One night is sufficient to relieve the patient. The urine acquires a very strong odor of sulphuretted hydrogen. L. Duchesne tried this treatment on a very severe case of some years' standing, with complete and permanent relief by the next morning. Dujardin-Beaumetz<sup>3</sup><sub>Feb. 1</sub> has employed the inhalations of *sulphurous acid* for



tuberculosis. To produce the vapor he burns, in a closed room, a candle made of a wick surrounded by paper containing nitrate of potash and sulphur, so arranged that not more than 10 gram. ( $2\frac{1}{2}$  drachms) of sulphur are burned per hour. Phthisical cases appear to possess a great tolerance of the vapor, and under its influence the expectoration diminishes. Dariex<sup>160</sup> also treated 70 cases of tuberculosis by inhalations of the acid. In 30 of these, in whom the process was in the early stages, the disease came to a stand-still, 20 cases further advanced did not continue under treatment long enough to be benefited by it, and 20 others in whom tuberculosis of other organs had already developed showed no improvement at all. F. E. Manby<sup>15</sup> says there is no doubt that fumigations with sulphurous acid immediately lessen the number and violence of the paroxysms in whooping-cough and facilitate expectoration. The disease gradually but surely ameliorates after the fumigations are commenced. In 25 years' experience he has seen no results so good as with this treatment, which he regards as a practical cure for the disease. His method of applying this plan is to dress the children some morning in clean clothes and remove them from the bed-room, into which all toys, clothes, etc., are then put, the doors and windows closed, and 25 gram. ( $6\frac{1}{2}$  drachms) of sulphur for every cubic metre of air-space are burned upon live coals. The fire is allowed to remain for five hours, the room then aired, and the children allowed to sleep in the room the same night. The day-room is fumigated in like manner during the night. Sometimes the process is repeated at the end of a week. P. D. Anthonisz, of Ceylon, Dec. 2, 1878<sup>2</sup> gives the result of his employment of the *bisulphide of carbon* in elephantiasis. In some of the acute cases the reduction of the swelling was prompt and complete; in others it was gradual, but satisfactory. In one case of 30 years' standing, one year's treatment, commenced when the man's legs were as large as his waist, left them only as large as his thighs. The writer adopts the theory that the disease is due to the presence in the blood of the *filaria sanguinis hominis*, and believes that the remedy is efficient by reason of the sulphur ingredient and its power to prevent the multiplication of the parasite in the body. The dose should be about 2 grains (0.13 gram.) in pills twice a day. The medicine should be temporarily stopped if it irritates the stomach. A. H. Newth<sup>6</sup> has administered the *hyposulphites* repeatedly

in cases of blood-poisoning with very marked success, and suggests that they be given for hydrophobia and as a prophylactic against it. C. P. Becker<sup>1</sup><sub>Sept. 15</sub> has found *sulphuric acid* very serviceable as a tonic. In the treatment of furuncles they have in his hands acted as a specific, and he has never failed to cut short a course of boils with them.

*Talc.*—Debove<sup>25</sup><sub>July 30</sub> has given talc in doses of 7 to 20 ounces (217 to 622 gram.) daily, mixed with milk, and found that in diarrhœa due to tuberculosis the treatment was uniformly successful. It was noticed, too, that substances which were not tolerated before could be readily taken during the administration of talc. The author was even able to give a pound of oil during the 24 hours.

*Tannic Acid.*—Nikolsky<sup>9</sup><sub>Oct. 13</sub> has successfully used an ethereal tincture of tannic acid in 18 cases of burns. The part is cleansed and the tincture brushed over it until a firm membrane is formed. This procedure is repeated twice or thrice daily as the membrane ruptures. Vesicles are incised, their contents expressed, and the surface of the wound dusted with iodoform and then painted with the tincture. The pain is in this way much diminished and the treatment not protracted. H. Boulland<sup>106</sup><sub>June 11</sub> has employed this acid in those cases of dilatation of the stomach in which lavage could not be used. The dilatation has diminished under this treatment in a manner analogous to that following lavage. When combined with the latter method recovery is still further expedited. As a hæmodynamic, also, administered internally, he has found it superior in many instances to other drugs of this nature. Ceccherelli<sup>3</sup><sub>Mar. 28</sub> having tried it internally and externally in 20 cases, regards it as an excellent means of treating osseous affections of a tuberculous nature, as it favors the healing of wounds and is endowed with powerful antiseptic properties.

*Terebene*—Betrin<sup>100</sup><sub>Feb.</sub> recommends the employment of terebene in uterine cancer. It should be mixed in varying proportions with some bland oil, as the oil of cotton-seed, almond, or olive, and 3 to 5 pledgets of cotton, each about the size of a walnut, soaked in it and applied to the cervix, being held in place by a tampon of aseptic cotton. The dressing should be removed every 1 to 3 days according to circumstances. The uterus and vagina should be thoroughly washed and dried before each application. The

author considers it a valuable plan of treatment, its good effects being due to its powerful antiseptic action on the microbic life abounding in uterine cancer. E. T. Bruen<sup>24</sup> deems terebene particularly valuable in phthisis where expectoration is difficult and scanty. It is on account of the vapors of this nature from pine-forests that residence in their vicinity is beneficial in this disease. The author has found that, when given internally, the gastric mucous membrane is injuriously affected, and, therefore, administers it with the vaporizer. D. M. Cammann<sup>1</sup> reports examples from more than 40 cases of pulmonary diseases in which he gave terebene. The usual dose was 15 minims (1 gram.) in a mucilaginous mixture 4 times a day. The results showed that it benefited both chronic and acute bronchitis, relieved the dyspnoea of emphysema, was readily borne by the stomach, and seemed to have a resolvent action on pleuritic adhesions.

*Terpene.*—W. H. Morse<sup>104</sup> writes at some length of terpene hydrate, claiming that it is not therapeutically interchangeable with other terebinthinates. It is both diaphoretic, diuretic, and expectorant, the diuretic action taking the precedence. The author administers it in tablets of 3 to 5 grains (0.20 to 0.32 gram.), and reports 26 cases favorably influenced by it, including bronchitis, nasal catarrh, laryngitis, emphysema, winter cough, phthisis, etc. The drug has all the advantages of turpentine without its injurious effects. H. L. Jenckes<sup>60</sup> prefers it in the following preparation proposed by Boyland: Hydrate of terpene, gr. 25 (1.62 gram.); glycerine, q. s. ut ft. sol.; syr. lactucarium, ad fl. oz. 1 (31 gram.). His experience leads him to believe it particularly serviceable in cases of respiratory catarrh where elimination is the main object of treatment. P. James<sup>6</sup> says it acts both on the bronchial mucous membrane and on the kidneys. Its action is much like that of other terebinthinates, over which it has the advantage of absence of odor and taste. Two to 3 grains (0.13 to 0.2 gram.) may be given every 3 to 4 hours. Vigier<sup>31</sup> recommends that it be prepared as follows: Honey, glycerine, āā 100 gram. (3 3 3 2); alcohol (95 per cent.), terpene, āā 7½ gram. (105 grains).—M. S.: Dose, 1 fl. drachm (3.88 gram.). The terpene will remain dissolved if added to water in the proportion of 1 drachm (3.88 gram.) to the glass. J. H. Smith<sup>186</sup> administers the drug by dissolving it in sufficient glycerine and using syrup

of lactucarium as a vehicle. He has been much pleased with it in throat and bronchial affections.

*Thallin.*—Demme<sup>386</sup><sub>v.27,II.4; Sept.</sub><sup>51</sup> treated 16 cases of articular rheumatism and other diseases in children with tartrate of thallin, the dose being 0.1 gram. ( $1\frac{1}{2}$  grains) for those over 5 years of age, and 0.025 to 0.05 gram. ( $\frac{1}{8}$  to  $\frac{1}{4}$  grain) at 2 to 5 years. Perspiration was more profuse than with antipyrin, and there was sometimes an accompanying chill as the temperature rose again. In very young children there were sometimes watery stools and colicky pains, and in 4 cases albuminuria and epithelial casts. Collapse and a cutaneous eruption were never observed from thallin. Jaccoud<sup>24</sup><sub>Apr.1</sub> considers it a powerful antipyretic, and advises that the initial dose be not more than 0.05 gram. ( $\frac{1}{4}$  grain), since the individual susceptibility to the drug is very variable. Teixeira<sup>256</sup><sub>Sept.30</sub> reports surprisingly good results with a 1 per cent. to 5 per cent. solution in the treatment of acute and chronic blennorrhagia. He has never observed any symptoms of irritation produced by it, and the disease is usually arrested in a few days. My own experience with thallin during the past year has but served to confirm my good opinion of it. It has proved itself particularly useful as an antipyretic in the diseases of children, and has seldom failed to reduce high temperature in pneumonia, scarlet fever, measles, and other diseases, and thereby to remove dangerous nervous symptoms. The dose for children is proportionately much larger than that for adults.

*Thyme.*—J. B. Johnson<sup>19</sup><sub>Mar.17</sub> has used a decoction of common thyme in whooping-cough, and says that the antispasmodic effect seen in promptly controlling the paroxysms is astonishing. It renders the disease milder in its course and shortens its duration. One ounce (31 gram.) of thyme in  $1\frac{1}{2}$  pints of water is boiled down to 1 pint, strained, and sweetened. Infants receive 1 to 2 teaspoonfuls of this every 1 to 2 hours.

*Theine.*—T. J. Mays<sup>242</sup><sub>Jan.</sub> employs theine for pain in various regions of the body. He gives  $\frac{1}{2}$  to 2 grains (0.032 to 0.129 gram.) hypodermically in the following formula; Theinæ, sod. benzoat., āā 3 1 (3.88 gram.); sod. chloridi., gr. 8 (0.52 gram.); aquæ, fl. 3 1 (31 gram.).—M. S.: Six minims equals  $\frac{1}{2}$  of a grain (0.032 gram.). He has on numerous occasions observed relief obtained in severe cases of lumbago within 5 minutes after the

injection. Some burning is produced at first, followed soon by an area of anæsthesia.

*Tribromphenol*.—F. Grimm<sup>60</sup><sub>Dec. 29, '97</sub> found tribromphenol powerfully stimulant to both simple and tubercular granulations. A gauze may be made with it for dressing wounds, and in this way its action is not too irritating.

*Turpentine*.—Röse<sup>81</sup><sub>Feb. 15</sub> has treated 60 cases of diphtheria with the oil of turpentine during the last 4 years, and has lost only 5 of them, 2 being moribund when the treatment commenced. The drug was given by the teaspoonful three times a day, mixed with spiritus ætheris (comp.?) as a corrigant, in the proportion of 1 gram. (15 grains) of the latter to 15 (4 fluidrachms) of the oil. At the same time he administered a tablespoonful of a 2 per cent. solution of sodium salicylate every 2 hours, and applied ice-bags, while a gargle of potassium chlorate was used frequently. There followed a prompt lessening of the fever and the rapidity of the pulse, relief of headache and difficulty in swallowing, shortening of the duration of the disease, sudden cessation of the progress of the local symptoms, and avoidance of the danger of choking, as tracheotomy was needed in but one instance. All painting of the throat was avoided. The drug should be used with caution in anæmic and decrepit cases, or where there is heart-disease. As soon as the patient is free of fever and the local symptoms have improved the treatment should be stopped. Usually 15 to 20 gram. (4 to 5 fluidrachms) are sufficient, though in a few instances 60 gram. (1 ounce 7 drachms) were necessary during the disease. D. H. Frölich<sup>69</sup><sub>July 19</sub> believes that the local application of turpentine is of value in diphtheria, but children strongly object to the procedure. He therefore has devised a tablet of sugar which contains 1½ to 3 drops of the drug, and finds that in this way it can be kept in constant contact with the throat. The tablets do not produce an unpleasant taste and are willingly taken by children. Pinkney<sup>144</sup><sub>Apr.</sub> advises the employment of turpentine baths in cases where rubbing with turpentine is unpleasant or painful. He prepares them by shaking 3 to 4 ounces (93 to 124 gram.) of the drug in a large bottle containing a saturated solution of old yellow soap. Half of this is poured into a bath-tub filled with warm water, and the patient placed in it for about 15 minutes. The result is a pleasant tingling glow of the skin. All denuded

or especially sensitive parts should be protected by some ointment before using the bath. J. Clay <sup>2</sup><sub>May</sub> claims that chian turpentine has, in his experience, certainly proved a palliative and sometimes a remedial agent in cancer. He has seen cases of cure of recurrent cancer after operation.

*Urethan*.—Demme <sup>57</sup><sub>Nov. 4</sub> <sup>224</sup><sub>Feb. 18</sub> considers urethan a quieting remedy in doses of  $1\frac{1}{2}$  to  $4\frac{1}{2}$  grains (0.1 to 0.3 gram.) 3 to 5 times a day for children of 1 to 3 years of age. As a true hypnotic 4 grains (0.25 gram.) should be given at the age of 12 to 18 months, 8 grains (0.5 gram.) at 2 to 3 years, and 15 to 35 grains (1 to 2.26 gram.) at 4 to 14 years. Large doses may be administered if the full effect is not obtained with these. The drug may be given without danger to very weak children, as it has no effect on circulation, respiration, digestion, or the nerve centres. As an enema it is very useful in non-organic eclampsia, as well as in the eclampsia of hydrocephalics. Sansom <sup>6</sup><sub>Dec. 31, '97</sub> considers urethan a harmless and efficient hypnotic in wakefulness due to palpitation of the heart in cardiac disease. The drug, however, soon loses its effect with use. In conjunction with Elwood Kirby I have reported <sup>9</sup><sub>May 19</sub> the result of over 60 administrations of urethan in 19 cases of insomnia. In only 2 cases was the hypnotic action really satisfactory, in a few others the effect was slight or doubtful, in 3 instances there were unpleasant secondary effects, and in the balance no action at all was witnessed. The amount generally given, 15 grains (1 gram.), was possibly too small, though it is that recommended by earlier writers upon it. Moreover, it was often repeated in two hours or less, and in 1 case as much as 60 grains (3.88 gram.) were given during the night without hypnotic effect. We were obliged to conclude, therefore, that, as far as our own experience extended, urethan was an uncertain and unreliable hypnotic, though in large doses it will at times prove useful.

*Vaseline*.—(See *Petroleum*.)

*Veratrum Viride*.—E. C. Rothrock <sup>176</sup><sub>Mar.</sub> has used veratrum viride for 28 years in various diseases. It is invaluable in pneumonia, and is often of service in the distressing cardiac dyspnoea of valvular disease. It is useful, also, in diseases of the urinary organs, and is unsurpassed in the febrile exanthemata. In acute laryngitis or bronchitis, meningitis, plethoric vertigo, acute diarrhoea, and diseases of the pelvic viscera the author has found it very

satisfactory. It should be avoided in all conditions of depression. J. E. Engstad<sup>202</sup><sub>May 2</sub> considers it a most useful though much abused drug, undoubtedly indicated where high febrile action is present. He reports several cases in which threatening symptoms were removed by its administration. A. H. Byrd<sup>19</sup><sub>June 2</sub> does not advise it in pneumonia, but claims that by diminishing inflammatory action it is useful in the early stages of syphilis and in scrofulosis. It is, further, a valuable remedy in puerperal fever. J. D. Rushmore<sup>15</sup><sub>Jan.</sub> sought to learn by letter the experience of the profession of Kings Co., N. Y., regarding the value of veratrum viride in puerperal convulsions. The 140 replies received showed that it has been used in this affection in very large doses, and seldom with alarming and never with fatal results. To control the convulsions it was necessary to bring down the pulse to 60 beats per minute. In this way it gave a mortality of 31 per cent. J. M. Boyd<sup>159</sup><sub>7.31, p. 627</sub> has treated upward of 70 cases of diphtheria with Norwood's tincture, and in no instance has the timely use of it disappointed him. To produce a slowing of the pulse and a diminution of its wiry character is an essential to success with the drug. He has no fear of asthenia from it, but rather of exhaustion from persistently rapid cardiac action. The initial dose for an adult is 3 drops, this amount to be increased by 1 drop every 2 hours until the pulse is reduced to 60 to 70 a minute. If vomiting is a troublesome symptom the dose must be increased cautiously or omitted occasionally.

*Viburnum Prunifolium*.—Schatz<sup>57</sup><sub>No. 28</sub><sup>80</sup><sub>Sept.</sub> believes that the solid extract of viburnum prunifolium administered in doses of 45 to 60 grains (2.91 to 3.88 gram.) for months is a very valuable remedy for reducing and even suppressing the uterine contractions which are so apt to occur in women who have aborted in previous pregnancies. Auvard<sup>80</sup><sub>Mar. 23</sub> has used the tincture for the prevention of abortion. He recommends it in cases where the membranes have been ruptured and the liquor amnii discharged, but where there are still hopes of preventing a miscarriage. It should not be given, however, when the foetus is dead, when a miscarriage has actually commenced, or when there is any reason why it is not best that birth should be delayed.

*Water*.—Dujardin-Beaumetz<sup>80</sup><sub>Dec. '87, Jan., Feb.</sub> gives an exhaustive review of the whole subject of hydrotherapy, including its history, its methods of employment, and the diseases in which it is

indicated. Its range of application is evidently very wide, in the opinion of the author. He describes Brand's method in detail. II. Corson<sup>462</sup> gives illustrations of his employment of cold water in disease, commenced 60 years ago, at a time when even the swallowing of cold water was forbidden in fever. He has during his years of practice used it in all forms of inflammation and in fevers, and never with any but the most satisfying results. Richard<sup>9</sup> speaks highly of the cold-bath treatment of typhoid fever, after the method of Brand. Out of 76 cases, 38 were treated in this way with only 2 deaths. Of the remaining 38, treated in the ordinary methods, 4 died. The temperature of the bath varied from 65° to 68° F. (18° to 20° C.), and the patient was immersed in it for 15 minutes every 3 hours if the axillary temperature exceeded 99.5° F. (37.50° C.). Cold affusions were practiced on the head during the bath. Barth<sup>9</sup> considered that the danger of the method of Brand lay in the pneumonia which he has very frequently witnessed as a consequence of the immersion. Renoy,<sup>9</sup> on the other hand, declared that statistics proved pneumonia to be much less frequent in patients treated by this method. W. M. Ord<sup>6</sup> recommends the use of the ice-pack in hyperpyrexia, and reports a case of acute articular rheumatism successfully treated in this way. He considers the antipyretic drugs unsafe in hyperpyrexia, since large doses are required, and poisoning may occur. Arkle<sup>6</sup> likewise reports 2 cases of rheumatism with hyperpyrexia and delirium treated with cold packs. MacLagan,<sup>6</sup> Coupland, and Barlow concur as to the value of cold water in the presence of high temperature. Heubner<sup>122</sup> recommends enveloping children in clothes wet with cold water as an excellent antipyretic means in acute febrile diseases. The amount of body-surface to which the clothes are applied is proportioned to the age of the child and the degree of fever. If the bath is employed, it is best to gradually diminish its temperature while the child is in it, rather than to immerse it suddenly in cold water. The cold-water treatment may be employed in pneumonia, the first period of typhoid fever, and the first week of erysipelas and scarlatina. It is to be avoided in measles and catarrhal affections. Energetic refrigeration may also be obtained by surrounding the body with cold plates wrapped in cotton, but this procedure must be watched carefully, or collapse may ensue. The application of cloths wet



with hot water is useful for warming the child and provoking perspiration. This procedure may be carried out with great benefit in catarrhal affections of the respiratory apparatus, particularly of the bronchia and lungs. For augmenting by reflex action the excitability of the bulbar centres and for regulating the movements of the heart and respiration, there is scarcely anything superior to cold affusions. This treatment gives the best results in atelectasis, bronchitis, catarrhal pneumonia, and enfeeblement of the heart. M. Höfler<sup>34</sup><sub>June 6</sub><sup>59</sup><sub>July 28</sub> finds that enemata of hot water produce a rapid increase in the urinary secretion. Within 3 hours the amount is increased threefold, and after this there is still an increase for the next 24 hours. There appeared to be no augmentation of the amount of urea excreted, the only change being a diminution of the specific gravity of the urine. There was, however, an increase in the rapidity of the heart-beat and a lowering of arterial tension. The amount of water used should not be over 1 litre (1 quart), and its temperature should not exceed 45° C. (113° F.) or be below 40° C. (104° F.). The injection should be made slowly and carefully, best directly after a movement of the bowels. The tube should be long enough to be introduced at least 10 centimetres, and the patient should lie down for 10 minutes after the injection and try to retain it all. Lorenzen<sup>22</sup><sub>July 18</sub> concludes, from experiments made on himself and others, that diminution of the amount of water ingested greatly decreases the body-weight in cases of obesity. P. Vernon<sup>100</sup><sub>Mar. 22</sub> writes enthusiastically in favor of the employment of Hunyadi-Janos water in all congestive conditions of the internal viscera, deeming it the most desirable form in which to administer a saline purge.

*Yeast.*—Heer<sup>41</sup><sub>Sept. 27</sub><sup>82</sup><sub>Oct. 1</sub> claims that with the internal administration and local use of beer-yeast he has treated with great success diphtheria, dysentery, cholera, incipient tuberculosis, scarlatina, infantile diarrhoea and that of typhoid fever, and various other affections, including a case of epithelioma of the tongue. He also refers to several cases of carcinoma claimed to have been cured by it.

*Zinc.*—W. D. Haslam<sup>139</sup><sub>Feb.</sub> states that a mixture of equal parts of iodoform and olcate of zinc is of great value in gynaecology, applied by insufflation or on a tampon.

*Zinnia.*—S. F. Landry<sup>139</sup><sub>Feb.</sub> claims that zinnia elegans mixed

with an alkali produces excellent results in relieving pain when used as a local application for burns.

*Sulphonal*.—Through an oversight this article was mislaid until too late for it to be inserted in its proper order.

This new hypnotic bids fair to be one of the best of its class, though it is not free from disadvantages, and its high cost is a very serious obstacle to its general employment. A. Kast<sup>4</sup><sub>Apr. 16</sub> tried it about 120 times on over 30 patients suffering from insomnia from various causes. Fifteen to 45 grains (1 to 3 gram.) produced calm sleep, lasting 5 to 8 hours, in  $\frac{1}{2}$  to 2 hours after taking the drug. There were not the slightest unpleasant sensations felt on awaking. Habituation did not seem to occur, even when the use of the drug was continued for weeks, and no disturbances of digestion were caused by it. G. Rabbas<sup>4</sup><sub>Apr. 23</sub> used it over 220 times in 27 cases of insomnia occurring in the most different mental disorders. He concludes that it is a hypnotic which, in doses of 2 to 3 gram. (30 to 45 grains), has a better action than amyl hydrate or paraldehyde in larger doses. Sleep comes in  $\frac{1}{2}$  to 1 or 2 hours, lasts 6 to 8 hours, and entirely resembles natural sleep. This is not so quickly as after chloral, but is of longer duration. There are no unpleasant after-effects observed. The author gives the history of his cases in detail. H. Rosin<sup>4</sup><sub>June 16</sub> gave sulphonal 274 times to 82 patients with insomnia, taking great care by means of control experiments that his conclusions should be accurate. He considers it in doses of 1 gram. (15 grains) entirely without hypnotic power. When, however, 2 gram. (30 grains) are given sleep is almost always produced, and there are no unpleasant after-effects. Even in cases of sleeplessness due to cough in phthisis the effect was frequently good, though morphia is to be preferred in this condition. Four gram. (60 grains) were also given without evil results except a giddiness which sometimes lasted the whole of the succeeding day. C. Oestreicher<sup>4</sup><sub>June 16</sub> has used the drug over 100 times in about 50 patients, most of them with some mental disorder. The usual dose was 2 to 3 gram. (30 to 45 grains). He believes it to be a safe hypnotic; less certain in its action than chloral, but to be preferred to paraldehyde and amyl hydrate on account of the absence of taste and smell. It has proved itself useful in the treatment of the morphia habit. It should be given some hours before the time to go to sleep, as its action is rather slow.

J. Schwalbe,<sup>69</sup> reports in detail his experience with sulphonal in 50 cases of insomnia occurring in different diseases. In doses of 1 to 2 gram. (15 to 30 grains) he deems it a good hypnotic, especially in nervous cases. It can be used safely in diseases in which cardiac weakness exists. The unpleasant secondary effects are scarcely worthy of note. G. Stewart,<sup>22</sup> mentions the successful results he has had with the new hypnotic. He gives it in doses of 15 to 30 grains (1 to 2 gram.) at 5 in the afternoon, and finds that it produces sleep at the ordinary time of retiring. J. C. Wilson and R. Hutchinson,<sup>19</sup> report a few cases of the graver forms of insomnia and maniacal excitement which were treated with sulphonal but without any perceptible effect. A. Cramer<sup>34</sup> <sup>69</sup> made 407 trials of the drug on 92 patients with mental disorders, and with good results in 92.6 per cent. of the cases. Sleep usually was produced in  $\frac{1}{4}$  to  $\frac{1}{2}$  hour, and lasted 5 to 8 hours. The general dose was 2 to 3 gram. (30 to 45 grains). No bad result followed even the continued administration for weeks, and no habituation was observed. In certain cases it was given mixed with the food without the knowledge of the patient. Regis<sup>188</sup> has used it in several cases of excitement but with unsatisfactory results; and T. E. Lovegrove,<sup>2</sup> states that the effects on the patients to whom he gave it were very discouraging. For several hours after taking the drug no appreciable result could be observed, but during a considerable part of the following day there was extreme drowsiness, with considerable cyanosis. Lehmann<sup>34</sup> <sup>9</sup> relates a case of a patient with asthma and insomnia, in whom chloral and morphia failed, while sulphonal proved an excellent hypnotic. Martin<sup>34</sup> <sup>9</sup> recommends it for the night-sweats of phthisis;  $7\frac{1}{2}$  grains at bed-time prove serviceable and afford the patient a quiet and natural sleep of 4 to 6 hours. The experience of Salgo<sup>84</sup> <sup>80</sup> has not been so favorable to sulphonal as that of some others. In sleepless paralytics he found it inferior to chloral and not superior to paraldehyde. In some cases a hypnotic action is entirely wanting, and in others it is slight. He has never seen its administration followed by disagreeable consequences. Langgaard and Rabow<sup>116</sup> <sup>80</sup> experimented on themselves and on numerous patients, and confirm in most respects the results of Kast. I. I. Johnson<sup>9</sup> reports a case of inveterate insomnia, extending over 20 years, only 1 to 3 hours of sleep being obtained

in the 24. The patient had tried various hypnotics, and was finally contemplating suicide. The first dose of 20 grains (1.33 gram.) of sulphonal produced 8 hours' peaceful sleep. The amount was afterward reduced to 15 grains (1 gram.), which was found to be sufficient. On one occasion 30 grains (2 gram.) produced 9 hours of sleep, and made the patient very somnolent during the following morning. Hilsmann<sup>288</sup><sub>Sept. 1; Oct. 80</sub> has employed this substance in several patients already accustomed to morphia, chloral, and other hypnotics, and has obtained satisfactory results. He has seen it produce sleep, lasting 8 hours in a phthisical patient disturbed by violent coughing. In a case of senile endarteritis, where morphia and antipyrin had failed to relieve paroxysmal pains, sulphonal rapidly removed them, and sleep followed. Spillmann<sup>184</sup><sub>Aug.</sub> has given it in doses of 1 to 2 gram. (15 to 30 grains) to a number of patients, and has found it produce sleep without the unpleasant sense of fatigue which follows opium. Otto-Dalldorf<sup>99</sup><sub>Aug. 23</sub> administered it in doses of 1 to 2 gram. (15 to 30 grains) to patients with mental disorders, and has been entirely satisfied with its action. Occasionally, unpleasant symptoms were observed on the next day after 2 gram. (30 grains) had been taken, such as dizziness, sense of tire, and unsteadiness in standing or walking. He has also tried its continuous administration in chronic excited mental conditions;  $2\frac{1}{2}$  to 5 gram. (37 to 75 grains) were given in divided doses during 24 hours with excellent results. Its quieting action appeared on the second, or even on the first day, and increased as the treatment was continued. Sometimes dizziness, and so much unsteadiness that walking was interfered with, developed after a daily dose of 3 gram. (45 grains). The author advises, therefore, that this amount be not exceeded, although he has never seen any other unpleasant results follow it than those described. When the quieting effect has been obtained the dose may be diminished. J. Fränkel<sup>4</sup><sub>July 23</sub> gave sulphonal in doses of 1 to 3 gram. (15 to 45 grains) to a number of cases of insomnia, chiefly among insane patients. Sleep was produced sometimes within 1 hour, sometimes not for 2 to 3 hours. Rarely the drug failed entirely. In several cases it occasioned on the following day such an extreme sense of fatigue and confusion of mind that its use could not be persisted in. B. Sachs<sup>59</sup><sub>Oct. 6</sub> has made about 60 trials of sulphonal on 15 patients,

some of whose histories he reports in detail. He concludes that it is valuable in functional insomnia and restores the natural desire for sleep. It is easily borne by the stomach and does not produce headache, except when given in large doses of 3 gram. (45 grains) or more. With some patients the drug appears to lose its effect if frequently administered. A. Kast, in a second article,<sup>116</sup> discusses the reasons why the action of the drug is sometimes so long delayed and why its effect is often continued into the next day. In order to avoid these effects he advises that it be finely pulverized and given in at least 200 centimetres of a warm fluid, with the evening meal, between 7 and 8 o'clock. The presence in the stomach of a large quantity of fluid, of hydrochloric acid, and of peptones and salts, thus favors the rapid solution of the drug. To prevent the too long continuance of its effects it is important that the dose be carefully determined for each case. Schmey<sup>116</sup> reports an instance of most unpleasant results following the administration of sulphonal to a patient, 61 years old, suffering from angina pectoris, the result of arterio-sclerosis. By the use of nitrite of amyl the attacks had been reduced to 1 or 2 a day, and were easily stopped. The hydrate of amyl was depended on to produce sleep, which it did very satisfactorily, and without any unpleasant after-effects. As the patient, however, complained of the taste, the author gave him 2 gram. of sulphonal, soon after which the attacks of angina developed with great violence, and occurred with only a few moments' intermission throughout the entire night. There was no real sleep, but only a half slumber lasting 2 hours, and often interrupted by the paroxysms. For the next 2 days, also, the attacks were unusually frequent and severe. The author advises, therefore, that the drug be not given in arterio-sclerosis and angina pectoris. G. Müller,<sup>116</sup> on the other hand, describes a case of a man of 72 years with well-marked arterio-sclerosis, who suffered from extreme dyspnoea, but who obtained relief and quiet sleep after 1 gram. (15 grains) of sulphonal was given him. He believes the results described by Schmey were merely coincident. M. Matthes<sup>319</sup> used the drug in 27 cases of insomnia, and considers it a useful though not always certain hypnotic. The dose varies greatly with the individual, though 1 gram. (15 grains) is usually sufficient, and this should be given at least 1 hour before the time the effect is desired.

In some cases ringing in the ears, headache, and dizziness were experienced on the next day, though depression and a tired sensation were more usual. In 2 instances it caused vomiting. Macvie<sup>22</sup><sub>June 12</sub>, <sup>90</sup><sub>Nov.</sub> has found it of value as a soporific. Thirty to 45 grains (2 to 3 gram.) are often required, though 15 grains (1 gram.) are sometimes sufficient in females, especially in acute affections. It produces no bad effects on the stomach, heart, or lungs, and may be continued indefinitely, since habituation does not occur. G. W. Rachel<sup>150</sup><sub>Nov.</sub> reports a series of 17 cases of insomnia from different causes, including often pain, dyspnœa, or cough, in which 1 to 2 gram. (15 to 30 grains) acted very satisfactorily. In only one instance was there any unpleasant after-effect, this consisting of slight dizziness. G. Algeri<sup>549</sup><sub>No. 228</sub>, <sup>57</sup><sub>Oct. 28</sub> deems sulphonal one of the best of hypnotics, having used it in a series of patients with different mental diseases. The dose employed was 1 to 4 gram. (15 to 60 grains), and sleep lasted 2 or more hours. There was no alteration of the respiration or circulation, and no bad results of any kind, except that after large doses the action of the medicine continues through the succeeding day. T. Zerner<sup>84</sup><sub>Nov. 10</sub> advises that it be given between 7 and 8 in the evening. The initial dose should be 2 gram. (30 grains), which may afterward be reduced to 1 gram. (15 grains) if found sufficient. He considers the drug to be entirely without influence on the heart, and has given it in cases of arterio-sclerosis without any bad results. It is also entirely harmless to digestion. In large doses he has seen it produce a drunken gait. Though it sometimes gives a slight relief to pain, it is not to be considered an analgesic. A. Ott<sup>88</sup><sub>Oct. 3</sub> agrees with writers favorable to sulphonal, having found it produce sleep in doses of 1 to 2 gram. (15 to 30 grains) and Garnier<sup>73</sup><sub>Oct.</sub> says that in the great majority of cases 2 to 5 gram. (30 to 75 grains) of it exercise a remarkable action, superior to that of other hypnotics. It has no influence on the circulation. While having used sulphonal with great satisfaction in a large number of cases, I am yet disposed decidedly to prefer amylene hydrate to it. The action of the sulphonal is slow in beginning and very apt to persist throughout the following day if large doses be given, while if small doses be employed I have found the hypnotic action frequently fail to make its appearance. Unpleasant secondary effects may develop even after small amounts, and the determination of the proper dose for each individual is a matter of considerable difficulty.

## EXPERIMENTAL THERAPEUTICS.

By HOBART A. HARE, M.D.,  
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*Aconitum Fischeri*.—Bradley<sup>82</sup><sub>Apr. 14</sub> finds that when this drug is given to a frog it decreases reflex activity, not by any influence on Setschenow's reflex inhibitory centre, but by a decrease in the conducting power of the motor nerves and by paralysis of the peripheral sensory nerves which gradually invades the trunks and finally the sensory side of the spinal cord, the motor side remaining intact. It has no effect on the muscles, and it is, therefore, evident that its action on the nervous system is similar to *aconitum napellus*. On the circulatory system Bradley finds that it acts as a direct cardiac paralyzant, producing a continuous fall of arterial pressure, not by any influence on the vasomotor centre, but presumably by the depression of the heart muscle, although the test of vasomotor integrity employed (medullary anæmia) cannot be said to be positively correct in its results. The drug produces, as do the other members of the same group, a slow pulse, afterward becoming more rapid and finally slower than before.

Bradley states that the primary decrease in rate is due to stimulation of the cardiac inhibitory ganglion, and that the increase in rate is due to paralysis of the same.

As no experiments are adduced, and as he states that the heart is arrested in diastole and cannot be stimulated to contraction by galvanism, it would seem probable that the changes in rate depend more upon the action on the heart muscle than upon the nervous mechanism of the viscus. Again, the statements made in regard to the cardiac action of the drug are somewhat contradictory, for in the next sentence it is stated that the stoppage of the heart in diastole is due to overstimulation and failure of its motor ganglion(!). The drug kills by respiratory failure of centric origin.

*Anhalonium*.—Lewin<sup>80</sup><sub>Jan. 21</sub> found this to be an intensely poisonous drug and that a few drops of a decoction used by him in the  
(B-1)

frog sufficed almost instantly to produce very marked changes, chiefly consisting in the appearance of shrinking of the body, so that the batrachian seemed to pass into a mummified condition. Simultaneously with these appearances, the animal raised itself upon its fore extremities and remained standing in this position like an ordinary quadruped, or crawled about. After fifteen minutes this spastic condition passed off and he rapidly returned to his normal condition. When larger amounts were given, death occurred in tetanic rigidity. It would seem that the symptoms produced by it are closely allied to those of strychnia, for Lewin noted that even after the spinal cord was severed peripheral irritation caused tetanus. On pigeons it was found that the drug produced convulsive vomiting in a few moments when given hypodermically. The bird spread its wings, crouched down to the ground, and if disturbed would twitch convulsively. Later the head was drawn sharply back, the mouth opened widely, and general convulsions asserted themselves. When death occurred the heart was always found in diastole. On rabbits the symptoms were those of strychnia poison. Up to the present time Lewin has not published any researches regarding its influence upon the heart and circulation.

*Antipyrin*.—Several studies directed to the physiological action of this drug have been published, but the only one directed to the question of its antipyretic effect has been published by Destrée, <sup>276</sup><sub>July 30</sub> of Bruxelles. With the calorimeter of d'Arsonval he finds that heat dissipation is decreased and that there is a corresponding diminution in the process of heat production. It will be remembered that these results are in accord with the studies made by Wood, Reichert, and myself in 1886, but are separated from those of Martin <sup>80</sup><sub>1887</sub> in that he found that heat dissipation was increased and production decreased.

It may be well to call attention to the erroneous assertions made by certain writers either concerning researches upon antipyrin carried out by others or by themselves; thus, we find Denian asserting that "in large doses antipyrin dilates the veins and capillaries, and that its antipyretic effects are partly due to the increased elimination of heat resulting from vascular dilatation." This assertion, so far as I know, is absolutely unfounded on any research so far published.



As to the action of antipyrin on nutrition, the most thorough study which we have as yet seen upon this subject is that of Robin,<sup>12</sup> who has confined himself almost solely to the consideration of the influence upon the kidneys. In six healthy subjects he found that a dose of from two to three grammes (thirty to forty-five grains) diminished the quantity of the urine from 20 to 40 per cent., and in several cases of disease this decrease was still more marked. If, for instance, the average diminution of the solids in healthy persons averaged 10 per cent., in typhoid fever this percentage of decrease was greater. He also noted that when the disease was a chronic one the diminution was more marked than if it was an acute malady, and that diminution was greatest in those diseases in which nutrition was compromised most severely.

Studies as to the quantity of urea eliminated under antipyrin showed this quantity to be comparatively small, whether the condition of the subject was normal or pathological. The uric acid was, on the other hand, increased in healthy persons, but in disease the effect was not so constant, for in some cases no change took place. Robin also found that the chlorides were diminished in most cases, but that in some instances this failed to be the case, the proportion being four diminished and one unaffected. The conclusions are that antipyrin diminishes the general tissue break-down of the body, and chiefly the break-down of the nitrogenous elements.

The same author affirms that the inhibitory influence exercised by antipyrin over tissue change is felt by the tissues forming the nervous system, and ingeniously argues that the sedative action of the drug in nervousness and pain depends upon decreased nervous metabolism.

It may not be out of place to draw attention to one or two points in the methods of Robin, which, while they do not necessarily impute any inaccuracy to his conclusions, have been unfortunately overlooked. Estimates of the quantity of solids excreted by the kidneys must necessarily be surrounded by so many conditions productive of error that any experiments attempted should be carefully arranged and still more carefully carried out. Particularly is this the case where the influence of one or two doses of a drug is to be considered, for it is perfectly possible that the

medicament may so influence the renal structure as to cause a temporary diminution of secretion which does not necessarily involve an actual decrease in tissue waste ; in other words, renal torpidity may show itself by decreased elimination, which passes away in the course of a short period and is followed by the elimination not only of the tissue waste of the time being, but that of the period during which the kidneys have lain inactive. It is this point which Robin has overlooked, since, from the account given in his paper, it is evident that measurements were only made during the action of the drug, and no control estimations were made before and after to eliminate the possible source of error just mentioned.

*Apocynum Cannabinum*.—The action of the root of this drug on the circulatory system in warm-blooded animals has been studied by D. A. Sokoloff, of St. Petersburg. <sup>509</sup> Aqueous infusions of the root were injected into the veins in the strength of eight grammes (one hundred and twenty-three grains) to one hundred cubic centimetres (three ounces and three drachms) of water, the individual dose amounting to from three (forty-nine minims) to ten cubic centimetres (two drachms and forty-five grains). His conclusions are as follow: 1. The drug produces a very pronounced retardation of the pulse, with a very considerable enlargement of the pulse-wave and a marked rise of the blood tension. 2. The initial retardation of the heart is followed by an acceleration of the cardiac action, while the arterial pressure ascends still further. 3. The cardiac retardation (first stage) is caused by an irritating action of the drug, both on the central and peripheral inhibitory apparatuses. 4. The subsequent acceleration (second stage) is not dependent upon anything like paralysis of the inhibitory apparatus, since the injection of another dose of the infusion can again give rise to a retardation of the heart's work. 5. On the injection of a very large dose the two stages are followed by a third one, which is characterized by cardiac arrhythmia, the appearance of Traube's waves, and a gradual fall of the blood pressure down to 0. 6. The rise of the blood tension during the first and second stages is dependent not only upon the stimulation of the vasomotor centres in the medulla oblongata, but also (and that in a very considerable degree) upon the excitation of the spinal vasomotor centres. Moreover, the heart and blood-vessels themselves take a certain active

part in the causation of the rise. 7. Both the central and peripheral vaso-dilatory apparatuses remain wholly intact.

*Arnica Montana.*—The effects of this drug on the circulatory apparatus being but little known, I undertook to study them, and found<sup>99</sup> that when a dose of from five to ten drops of the official fluid extract of arnica root is injected into the jugular vein of a dog weighing from fifteen to twenty pounds, the pulse-rate and arterial pressure are for a moment depressed, but in the course of from thirty seconds to a minute return to their normal position. In about five minutes, however, the pulse-beats become one-third slower than they are normally, the arterial pressure remaining unchanged, save that the pulse-waves usually produced by inhibitory stimulation give it a greater range. If under these conditions the pneumogastric nerves be cut, the pulse instantly increases its rate considerably beyond the normal, though not to the point generally produced when the peripheral vagi are in a normal state. This difference was, however, more marked in some cases than in others. We may, therefore, conclude that the drug stimulates in small, ordinary doses, the vagal centre in the medulla, thereby producing a slow, full pulse, and that it has an effect on the peripheral ends of the vagus for the reason that when these nerves are cut the pulse-rate is only somewhat increased. That this failure of the pulse to become very rapid after vagal section is not due to cardiac depression is proved by the strong pulse-waves and the increase in arterial pressure rather than a fall.

When a much larger dose (five cubic centimetres) is given to a dog of twenty pounds (ten kilogrammes) weight the primary slowing does not take place, but in its stead the pulse becomes very rapid, with a fall of arterial pressure which, however, soon recovers itself, the pulse still remaining rapid. Under these circumstances it was found that galvanizing the vagus nerves, even for as long as one minute and a half, failed to produce any cardiac slowing, proving palsy of peripheral vagi. This was also proved by the fact that when the vagi were cut and their peripheral ends stimulated by small doses, large doses immediately produced a rapid rate, but no more than a momentary fall of arterial pressure, lasting perhaps twenty seconds, and due simply to the sudden entrance of the drug into the heart *en masse*.

*Arnica*, therefore, slows the pulse in ordinary medicinal dose

by stimulating the pneumogastriacs both peripherally and centrally, increasing the fullness of each pulse-wave, and also slightly the arterial pressure. That the increased arterial pressure is chiefly due to increased work done by the heart is strongly indicated by the fact that in none of the experiments was arterial pressure influenced to any extent by any dose, except when an enormous amount (five cubic centimetres—one drachm and twenty-one grains) was injected rapidly into the jugular vein, when there was for the space of from ten to fifteen seconds a fall in pressure very evidently due to momentary heart-failure, as the pressure returned at once to normal as soon as the heart freed itself from the volume of the drug.

That the fluid extract used was pure I am confident, since it was prepared by a reliable druggist especially for these experiments, and that no fallacy underlies the results of the experiments themselves seems proved by the fact that no less than seven tracings were taken from the carotid artery of as many different dogs, and in all cases the effects were the same.

*Barium: Its Similarity to Digitalis.*—Notwithstanding the fact that the salts of barium have very rarely been used in medicine, it would appear that they really possess considerable therapeutic value. Recently Bary, of Dorpat, <sup>6</sup> found, as did Ringer, that it exerts its chief influence over the heart, and resembles very closely in its effects those of digitalis. In the frog small doses of barium increase the action of the heart muscle, and in large doses arrest this viscus in systole. The interesting fact was discovered that a heart arrested by muscarin or chloral was started again by using this salt, and it was also found that the strongest electrical stimulation of the vagi failed to relax the systolic spasm. Furthermore, it was proved that this loss of inhibitory control was not due to a depression of these nerves, but to the direct cardiac effects. In warm-blooded animals the drug slows the heart solely by its action on this viscus, but if very large doses are given there is a primary acceleration of the pulse, probably due to stimulation of the accelerator nerves. Finally, this is replaced by slowing caused by direct depression of the heart muscle. Barium also increases to a marked extent arterial pressure, and, like pilocarpine, increases the secretion of saliva. It would appear that practical bedside studies as to the influence of this drug might prove of value.

*Bismuth.*—Kocher<sup>404</sup><sub>No. 224</sub> and Petersen<sup>60</sup><sub>Jan. 20, '97</sub> have recorded a number of cases of poisoning produced by the absorption of insoluble preparations of bismuth when used as surgical applications, in which there was acute stomatitis, a blackened, ulcerated mucous membrane, followed by intestinal catarrh with pain and diarrhœa, and in severe cases by a true nephritis. In the early studies of bismuth made by Dalché and Villejean the effects of acute poisoning only by the subnitrate of bismuth were observed. In a more recent study<sup>67</sup><sub>Nov. 12</sub> they have investigated chronic poisoning by the drug by injecting into dogs repeated doses of the compound at intervals of several days or hours. They obtained results closely allied to those reported as present in the human being by Kocher and Petersen, save that death followed in the train of these signs, which were, by reason of the large-size dose, very severe. Ulcerations replaced the aphthous patches, the liver was found congested, and the coats of the large intestine blackened. These changes came on in strong, healthy dogs weighing from fourteen and one-half to fifteen kilogrammes (twenty-nine to thirty-five pounds).

*Borneol.*—This substance, derived from the *Dryobalanops camphoræ*, a tree of Sumatra and Borneo, has recently been studied by Stockman.<sup>178</sup><sub>v. 9, No. 2, 2</sub> In frogs it produces lethargy without any preceding stage of excitation; inco-ordination comes on, while the respirations become slower and deeper. The reflexes are preserved till a late stage, but are finally abolished. The motor nerves are not affected directly by the poison. In cats there are violent convulsions of an epileptiform character, with total loss of sensation, dependent upon depression of the sensory nerves and the receptive side of the spinal cord. The temperature falls and death ensues by paralysis of respiration. As with many other drugs, it may be said of Borneol that in the higher animals the encephalon is most affected, whereas in the frog the spinal cord fails most rapidly.

*Calomel.*—Sawadsky<sup>220</sup><sub>Mar. 14</sub> believes calomel to have a marked disinfectant effect upon the intestinal canal, which depends upon the transformation of the drug into an oxide of mercury through the influence of the bile and the alkalies of the intestinal canal. The colors of the "calomel stools" he attributes to an excess of biliverdine, which escapes the phenomena of oxidation and which also possesses antiseptic powers.

*Chloroform.*—Salkowski<sup>60</sup><sub>No. 16</sub><sup>90</sup><sub>Aug.</sub> has investigated, after Koch's

methods, the degree to which chloroform-water acts upon micro-organisms. He has used chloroform for some years to prevent urine decomposing before he had time to examine it. Chloroform prevents all fermentations which depend upon the growth of micro-organisms—*e.g.*, alcoholic fermentation, ammoniacal fermentation of urea, conversion of hippuric acid by fermentation into benzoic acid and glyocol, lactic fermentation, and the putrefaction of albumens, but it has no action on those processes caused by unorganized ferments, as ptyalin, pepsin, etc.

Milk to which has been added a little chloroform, kept in a well-corked bottle, keeps its alkaline reaction, but at the end of three months changes to a fine jelly, which, by shaking, forms a white sediment of casein and fat, and a yellowish, clear liquid. Sterilized milk behaves in the same manner, which Meissner explains as due to a slowly acting curdling ferment. Cane-sugar and grape-sugar along with chloroform do not ferment with yeast, but next day the cane-sugar is converted into invert-sugar by an unorganized ferment in the yeast. Albuminous transudations and pounded meat remain sweet when treated with chloroform, and are found to be free from organisms, both by the microscope and by inoculating gelatine and other nutrient media.

Further, chloroform not only hinders the development of micro-organisms, but also brings about their destruction. Thus, an ill-smelling meat broth, shaken up with a few drops of chloroform, at the end of an hour was quite sterile.

Silk threads impregnated with anthrax bacilli, free from spores, and exposed to chloroform water for twenty-four hours, failed to inoculate gelatine plates, etc., whilst in control experiments a positive result was obtained. Mixtures of chloroform-water and crushed spleens from cases of splenic fever were found to be sterile after standing thirty minutes. Guinea-pigs were inoculated with half a Pravaz syringeful of a fluid composed of one drop of anthrax blood and eight cubic centimetres of sterilized water or chloroform-water. All the animals died within forty-eight hours when water alone was used, while the others which had been treated with chloroform-water and anthrax blood remained quite healthy. The reagent had no action on the *spores* of anthrax.

The action on comma bacilli is so energetic that a fresh cholera cultivation, mixed with an equal volume of chloroform-water, is

disinfected at the end of a minute. The proof of this is that one fails to get any growth in peptone solutions, gelatine, and like substances. This property of chloroform is of great use in the laboratory to keep urea solutions, aqueous solutions of various ferments, pathological fluids, and in artificial digestive experiments, especially with trypsin. It will be useful to add a few drops of chloroform in preparing artificially digestive foods for patients, provided the vessel be kept well closed. The objectionable bitter taste will not be developed, and if the taste of the chloroform be objected to it can be removed by a few minutes' boiling. Also, chloroform-water can be used instead of glycerine to make solutions of various ferments, as pepsin, trypsin, etc. The use in pharmacy will strike every practitioner. It may be used instead of rectified spirit for keeping solutions of alkaloids and also in the preparation of infusions. It is a useful and cheap preservative for anatomical preparations, though it gradually becomes colored with hæmoglobin. This might be prevented in various ways, either by laying the specimen in strong alcohol for a short time previously, or by combining it with Grawitz's fluid. Also by previously washing out the blood in a stream of water.

Other uses are: (*a*) To prepare solutions for subcutaneous injections; (*b*) to employ it internally in diseases of the digestive organs depending on the presence of micro-organisms, among others, cholera. Possibly the benefit that many patients derive from stomachic mixtures containing chloroform-water as the vehicle is due to its destructive action on various micro-organisms. Salkowski gave a dog two hundred cubic centimetres (about six and one-half ounces) of chloroform-water with its food for four days without producing any effect, so that in the treatment of a disease like cholera large quantities of chloroform-water might be given. It is even recommended as a mouth-wash.

In relation to the effect of chloroform on respiratory activity Saint Martin has published the results of his researches on this subject, and his conclusions are that the amount of oxygen in the blood is decreased and the carbonic oxide increased. These results contradict those reached by Paul Bert in 1870, but are identical with Bert's conclusions in 1885, when further experimentation had proved his earlier results erroneous.

*Cocaine.*—Richet,<sup>3</sup> at a meeting of the Société de Biologie,

recorded the variety of convulsions which he had seen produced by injections of this drug in the animal economy, pointed out that they were identical with those of cortical epilepsy, and determined that this was in all probability true by the discovery that stimulation of the motor regions of the cortex produced more marked effects than ordinarily occur under such circumstances. In a later communication, Langlois and Richet,<sup>3</sup> have made still further studies concerning this subject, in which they find that there is an enormous increase in the temperature of the body at the same time that the convulsions come on. These results are identical with those obtained by Mosso. I also have found them to be present, but have noted in addition that frequently, previous to the onset of the actual convulsion exceeding rapid running came on, which always was circular and in which the animal turned always from right to left, the circles toward the end becoming smaller and smaller until the animal fell in the complete convulsion.

As to the influence of bodily temperature on the action of cocaine, Langlois and Richet<sup>479</sup> have found, as have all other experimenters with this drug, that cocaine when given intravenously into the jugular vein of a dog produces a very marked rise of bodily heat, and they also state that variations of the bodily temperature by artificial means influence very greatly the power of the drug over the nervous system, and that animals whose temperature is raised by a warm bath, before the dose, rapidly become convulsed and die, the increase in temperature of the body by the drug over and above that already produced artificially aiding in production of a fatal issue. They have also noted that cooling of the body prevents such a termination of the case.

*Cocculus Indicus*.—Mary P. Jacobi, of New York,<sup>1</sup> found that picrotoxin, the active principle of this drug, had no influence over the peripheral nerves and the spinal cord of frogs, her reason for this belief resting on the fact that no convulsion occurred in the limb paralyzed by destruction of one optic lobe, and possibly some injury to the corresponding half of the medulla (oblongata?). So many possibilities of error arise from this method of experimentation that we cannot receive this opinion as proved, particularly as the convulsions produced by picrotoxin in the frog were typically tetanic. The amount given to the frog was 0.001 gramme (0.015 grain). On the circulatory system of the higher animal, represented by the



dog, picrotoxin, in the same dose, injected into the jugular vein produced a moderate slowing of the pulse "in comparison to the respiration," there being six instead of eleven pulsations to each respiration. The respiratory movements were accelerated to double their previous rate. Later, on the injection of 0.002 gramme (0.031 grain), the pulse was slowed as well as the respiration. The convulsions produced by the drug in warm-blooded animals, Dr. Jacobi states, are purely epileptoid.

The acceleration of the pulse is possibly due to stimulation of the excito-motor ganglia of the heart, but no evidence is adduced for such a hypothesis. It is also stated that tracings from the carotid artery showed no change in blood pressure, whereas sphygmographic tracings do so, and the conclusion is drawn from this basis that "all these circumstances point to dilatation of the peripheric arteries, associated with so great an increase in cardiac power as to avoid any fall of pressure." The statement is also made that this slowing of the pulse is due to medullary vagal stimulation.

It is evident from what has been said that the conclusions reached in this research are arrived at by hypothetical reasoning rather than actual experiment, and lack all of the control tests so necessary for accurate experimental research.

*Coffee or Caffeeon.*—Marshall and myself<sup>9</sup><sub>Mar. 31, '98</sub> have studied the action of the empyreumatic oil of this plant. We calculated that the percentage of oil obtained from an average browned coffee was 11.6 per cent., and that in consequence an ordinary breakfast cup of coffee contains about three cubic centimetres (forty-five minims) of the oil, provided all the oil in the coffee used is extracted. The results of our studies were that the oil possesses none of those powers of a toxic character heretofore supposed. The pure oil increases the pulse-rate by direct cardiac stimulation in small doses, and lowers pulse-rate in large doses by a direct depressant effect on this viscus. On the highly developed spinal cord of the frog it causes increased reflex activity, but on the mammal with a well-developed brain drowsiness and sleep, although we found that further experimentation is necessary for the decision of this point. In three instances in human beings the oil produced sleep in the dose of four cubic centimetres (one drachm), but in one case it failed to do so. No gastro-intestinal symptoms arose from its use in any form.

*Caffeine*.—V. Schröder,<sup>54</sup> has previously shown that caffeine acts directly upon the renal epithelium, at the same time that a contraction of the vessels is occasioned by this agent. Caffeine, it is known, causes not only a general reflex spasm of the vessels, but also by increased action in the central vasomotor apparatus, a spasmodic tension of the vessels, leading to augmented blood pressure. Division of the vasomotor nerves of the kidneys, or narcotism of the nervous centres, allows the action pure and simple of caffeine upon the renal epithelium. The author had used chloral, but now employs paraldehyde for the narcotizing of the nervous centres. This substance, administered alone to rabbits, increases the quantity of urine to the amount of 1 per cent. of the weight of the body; when given with caffeine, the diuresis is raised from 3 to 5 per cent. of the same weight. The relative proportion of solid material is at the same time increased from 14 to 15 per cent. The mass of blood in a rabbit being estimated at from one hundred to one hundred and fifty grammes, this would imply a loss in the blood from one to two grammes of water, the quantity of urine being augmented from one hundred to one hundred and thirty grammes. Caffeine has no similar diuretic action in dogs, a noteworthy fact, which remains to be accounted for.

*Colchicine*.—Obolonski has<sup>311</sup> made a series of experiments with this alkaloid for the purpose of determining the three following points: 1. The minimum quantity of colchicine which can be detected in mixtures with various organic substances or in the organs of animals poisoned by it. 2. The length of time colchicine resists decomposition under such circumstances. 3. What change, if any, it undergoes during the process of extraction. 4. Its most characteristic reaction. Thirty experiments were made, divided into three groups: 1. With aqueous solutions of colchicine. 2. With mixtures of colchicine and various tissues. 3. With the organs of rabbits and dogs killed by the drug and examined after periods varying from three and a half hours to four and a half months. The method of extraction was by means of chloroform, and the author asserts that this fluid has no influence over the alkaloid, even if kept in contact with it for two days. In this he stands directly opposed to Vulpian and Schützenberger, who state that when colchicine is extracted by chloroform it undergoes a change, after which it does not strike a violet color with nitric acid.

Animals poisoned with colchicine died in ten or fifteen hours after the administration of the drug, and their tissues were analyzed at the various intervals already named. The amounts of the alkaloid employed were .50 (7.5 grains) and 0.01 gramme ( $\frac{3}{50}$  grain). In all instances the symptoms produced were typical of colchicum poisoning. It was found that as small a quantity as 0.005 gramme can be detected with certainty; that colchicine is a very stable compound, decomposed with difficulty, and only when it is in the presence of organic matter thoroughly advanced in putrefaction. As the alkaloid is most readily found in the kidneys and urine, it is well to pay particular attention in medico-legal cases to these organs and this secretion. Obolonski does not think that there is any danger of confusing the reaction for ptomaines with those of colchicine. The test always employed by him as being the most reliable was that with nitric acid, and he expresses a lack of confidence in Erdmann's reagent, as well as in Mandelin's.

*Creolin.*—Neudörfer, <sup>341</sup><sub>Na.28</sub> from studies upon animals, finds that creolin when injected intravenously produces a poisonous effect, and that if the amount equals 0.5 gramme (7.5 grains) to the kilogramme (two pounds) of body-weight, death ensues. General spasms are produced by it, and intense restlessness and pain assert themselves under its influence. After death the heart is found heavily surcharged with blood, and the kidneys and liver also are congested. Early in the poisoning there is profuse salivation. Eisenberg <sup>84</sup><sub>Apr.28</sub> concludes from exhaustive bacteriological studies that creolin is at once a cheap and useful disinfectant.

*Chloride of Sodium.*—Loye and Dastre <sup>8</sup><sub>Apr.4</sub> have found what many physiologists have known for a long time, namely, that if one injects into the vein of an animal a solution of common salt of the strength of seven to one thousand it is possible to throw into the circulation a quantity of liquid equal to or greater than the weight of the animal. Not more than two grammes (thirty-one grains) should be injected per minute for every kilogramme (two pounds) of animal. It has been pointed out by Grasset that, as these injections increase diuresis, they also might be employed in jaundice in order to eliminate the bile which is in the circulation. This proposition resembles very closely the custom already in vogue, namely, of injecting water into the rectum, which, after it is absorbed, is eliminated loaded with bile.

*Erythrophlœine*.—The year 1888, like most of its predecessors for some years past, has brought forth another local anæsthetic, which for a time absorbed a large amount of the attention of clinicians on both sides of the Atlantic. In the studies made of it by Lewin,<sup>4</sup> it was found that when it was placed in the eye of a cat complete anæsthesia in fifteen or twenty minutes resulted, persisting from ten to twenty-four hours. In frogs and other animals in which the solution was injected, rapid diminution of the heart-beat was noted, followed by paralysis of that organ, and accompanied by convulsive spasms which, beginning in the anterior portion of the body, rapidly spread to the posterior portion. In those animals capable of vomiting the drug almost immediately produced emesis. It was also found that if a solution stronger than one in five hundred is instilled into the eye irritation and cloudiness of the cornea results, which disappears spontaneously in a few days. In the studies made by Egasse,<sup>296</sup> in which the drug was given hypodermically to the frog, symptoms other than those mentioned came on, convulsions, preceded by persistent dyspnœa, and followed by paralysis, while loss of reflex activity and finally of sensibility were noted. He also found that pigeons were convulsed by it. The results (Goldschmidt<sup>319</sup>) are in accord with those that the investigator has already named.

*Hedwigia Balsamifera*.—Gaucher, Combemale, and Mares-tang,<sup>152</sup> in studying this drug, find that the respirations are increased in number and are rendered irregular by its use, and that it produces a fall of temperature amounting to 1.5° C. in thirty-five minutes. When 0.298 gramme (4.5 grains) of the drug is given per kilo (two pounds) to the rabbit death ensues in one hour, and is preceded by loss of reflex activity, a remarkable fall of bodily temperature, and loss of sensibility. The conclusions which they reach are that it produces great vasomotor depression and cardiac paralysis, and that it is at once a paralyzant and convulsant, exerting its influence upon the medulla oblongata and spinal cord.

*Bitter Acid of Hops*, only recently discovered by Bungener<sup>278</sup> while in the act of extracting lupulin, is a very unstable body, and when exposed to the air hardens into a yellow, resinous mass, which is non-crystalline and soluble in water. It is to be remembered that this acid is poisonous, whereas the bitter principle found

in beer is not. Given in the dose of 0.002 gramme ( $\frac{1}{32}$  of a grain) to a frog it produces paralysis of the central nervous system and the heart. There is marked disorder of co-ordination, followed by total loss of reflex action and paralysis, but the paralysis is invariably preceded by a stage of tetanic spasm. The first influence which it exerts over the heart is the production of a slight slowing of the pulse without any appreciable loss of power. Later, however, contractions become less and less energetic and the heart finally ceases to act. Bungener believes, although he does not state his reasons for so doing, that the cardiac ganglia are affected at first, and later the muscle itself. He notes that in warm-blooded animals the medulla seems to be the seat of its chief influence. Respiration is at first greatly increased and later paralyzed, and it would appear that small doses only cause stimulation without the succeeding paralysis. As the investigator states that the heart continues to beat after cessation of respiration, it is evident that the drug causes death by respiratory and not cardiac failure.

The rather remarkable statement is made that internally and subcutaneously the drug produces no poisonous effects either upon pigeons or rabbits, and as the research of Dreser<sup>273</sup><sub>M.H.2</sub> contradicts this statement it is evident that some fallacy must underlie this assertion.

While the experiments of Dreser are in accord with those of Bungener in regard to the influence of the bitter acid of hops upon frogs, he finds that the respiration in warm-blooded animals becomes irregular and coughing, and that cramps assert themselves.

*Hydrastis Canadensis*.—From a large number of experiments made on animals with the root of *Hydrastis Canadensis*, Givopiszew<sup>67</sup><sub>Nov. 2, '06</sub> arrives at the following conclusions: An aqueous extract, taken even in large quantity, produces no toxic effects in warm-blooded animals. It produces always a reduction of the blood pressure without any preliminary increase. It always produces in rabbits contractions of the uterine body and horns. The author further noted that under the influence of *Hydrastis Canadensis* the uterine contractions are most intense in cases of advanced pregnancy or soon after delivery, while the most feeble contractions occur in a virgin uterus after its use. Large quantities of this extract may produce premature delivery in the second half of pregnancy.

*Hydrofluoric Acid*.—In relation to the action of the vapor of

hydrofluoric acid on the bacillus tuberculosis, Grancher and Chautard,<sup>14</sup> conducted two series of experiments. In the first they studied the action of the acid when taken through the respiratory passages, and in the second series its powers when applied directly to the organisms. The conclusions reached in the first series were that the vapor is really of very little value, and in the second series that if its use is prolonged and direct it diminishes the virulence of the microbes but does not kill them.

*Iodoform*.—The experimental studies made by German, Danish, and French observers during the year 1887, the results of which will be found in the ANNUAL of last year, were supplemented in the early part of the past year by those of an American, J. Amory Jeffries, of Boston,<sup>5</sup> and later by those of Kunz.<sup>319</sup>

Jeffries' research was one of the most thorough that has so far been undertaken, and its chief results in no way disagree with those of the observers already quoted, save that the iodoform seemed to possess more power than was thought by Heyn and Rovsing. Jeffries reaches the following conclusions, which embody, in our belief, the entire truth of the matter: 1. Iodoform, not being a germicide, is not a fit substance for use in procuring asepsis of instruments, materials, or wounds. 2. Iodoform is allowable in infected wounds where the true germicides are contra-indicated by danger of poisoning or impracticability. 3. Iodoform, having a decided tendency to stop serous oozing, may be employed in wounds where the moisture threatens the integrity of the antiseptic dressing.

The results of Kunz, obtained from the application of iodoform to the tubercle bacillus, the septicæmia of rabbits, and the staphylococcus aureus, were also entirely in accord with the other investigations heretofore published.

*Iron*.—As most therapeutists know, there has been a lack of knowledge as to the ultimate condition of iron after it has been introduced into the organism. Some persons have claimed that iron is a food rather than a medicine, since it can be given for long periods of time without any of it appearing to escape from the body. The idea, however, that none of it ever does escape is not only theoretically incorrect, but we have at the present time positive evidence of its falsity. Zalêski, of Dorpat,<sup>6</sup> has, by a series of careful experiments, advanced our knowledge somewhat in this respect.

He first took two rabbits of the same litter, as nearly as possible of the same color and weight, and reared them under similar conditions, taking care that they had access to no food or drink containing any iron. When they were ten weeks old they were kept without food for four days, being allowed water only. Into the jugular vein of one of them was then introduced three cubic centimetres (fifty drops) of a solution of sodio-tartrate of iron, containing .0096 gramme (about 0.1 grain) of metallic iron. No symptoms of acute poisoning occurred during three hours. At the end of that time the carotid artery was opened and as much blood as possible removed. The whole vascular system was then thoroughly washed out by means of a special apparatus which is used for this purpose in the Strasbourg Pharmacological Institute. The liquid employed was a warm, weak solution of sugar, which was introduced into the aorta and allowed to run out from the portal end. This washing out was continued till the red tint of the muscles and other organs had disappeared so completely that the spectroscope detected no hæmoglobin lines. The other rabbit was also deprived of blood in precisely the same way. The organs of the two animals were then examined chemically and the iron contained in them accurately estimated by the volumetric method. The result showed that the only organ in which the percentage of iron was markedly increased was the liver in the animal into whose system the sodio-tartrate had been introduced, the dry substance of the organ containing .0998 and .1723 per cent. of iron in the two animals respectively. A similar research was subsequently carried out in the case of two kittens. Here the livers contained respectively .0431 and .0895 per cent. of iron, most of the other organs showing more iron in the animal into which none had been introduced than in the one in which the sodio-tartrate had been injected. The most remarkable instance of this was the muscular tissue, which, in the kitten that had had no iron, showed a percentage of .0206 and in the one which had had iron only .0073. Of this curious fact Zaléski does not see his way to offer any explanation, and it certainly appears somewhat paradoxical. In both the rabbits and kittens it was plainly demonstrated that the walls of the stomach and intestines in the animals which had been subjected to the intravenous injection contained no more iron than in the others. The result of the research would appear to suggest

that the liver has some claims to be considered the excreting organ for iron.

The experiments of Skvortzoff,<sup>586</sup> carried out in the laboratory of Tümas, in Warsaw, in regard to the influence which iron exercises over nitrogenous metabolism in the healthy body gave the following results: 1. Iron has no marked influence on nitrogenous metamorphosis in the healthy body. 2. The ingestion of iron in daily doses of 0.02 to 0.03 gramme (0.3 to 0.5 grain) causes a very slight decrease in the assimilation of the nitrogenous portions of the food. 3. After bleeding the assimilation of nitrogenous substances increases a little whether iron is used or not, but if iron is used at this time the hæmoglobin is rapidly reproduced, and the drug would seem to be of value in restoring the bodily weight.

*Lanolin.*—Immanuel Munk<sup>392</sup> has tested the absorbability of lanolin in the intestine. This question is physiologically not without importance, since lanolin only commences to melt at 50° C. (122° F.), and is only entirely fluid between 55 and 56° C. (131 and 133° F.). The melting point, therefore, is a considerable number of degrees higher than that of the fatty acids contained in the sebaceous secretions formed by the skin of the sheep. Of these latter substances Munk has found that, although they only melt at a point considerably above the temperature of the animal body, yet they are all but 12 per cent. absorbed in the intestine. Munk's experiments, which were made in the Pharmacological Institute at Berlin, under Liebreich's directions, lead to the following conclusions: A dog weighing twenty pounds, after two days' fasting, was fed on three hundred grammes of meat, with three hundred grammes of water, boiled with fifteen grammes of pigs' fat and 29.6 grammes of lanolin. The fæces contained 28.688 grammes of fatty acids and soaps. In another dog, after fasting, a mixture containing three hundred grammes of meat and fifteen grammes of fat, without lanolin, were given, and in this animal the fæces only contained .52 gramme of fatty bodies. Comparing this with the lanolin experiments, it appears that 28.168 grammes of the fat containing lanolin have escaped absorption; or, in other words, that 96 per cent. of the lanolin is entirely unabsorbed in the intestinal tract; but when it is considered that although the temperature of the body is not sufficiently high to lead to the complete



melting of the lanolin, yet it will soften it sufficiently to cause it to cling to the walls of the intestine, and so delay its removal in the *faeces*; it would seem to be positively proved that absolutely no absorption of lanolin occurs in the alimentary tract. This result is of interest from two points of view. It shows, in the first place, that fats whose melting point is over  $52^{\circ}$  C. ( $125.6^{\circ}$  F.) are incapable of absorption, while those whose melting point lies between  $49$  and  $51^{\circ}$  C. ( $120.2$  to  $123.8^{\circ}$  F.) are capable of absorption. It also indicates, as Liebreich has maintained, that where lanolin is it must there have been manufactured, since it cannot have been absorbed by the alimentary tract.

*Lathyrus Sativus*.—According to Schuchardt<sup>326</sup>,<sup>80</sup> the chief effects produced by this drug are on the muscles of the lower extremities, especially on those below the knee. Horses fed on this plant for a considerable period drop from paralysis of the hinder extremities on the least exertion, and in some cases the nerves in the anterior portion of the body are affected so that death has resulted from paralysis of the recurrent laryngeal nerves, causing asphyxia. So far as is known this laryngeal affection has never as yet made its appearance in a human subject, and death very rarely takes place. Cantani, of Naples,<sup>6</sup> has made a careful study of the subject and has found that the adductors are much less affected than the abductors. The muscles of the face, neck, and extremities were not affected at all in his cases, but only those of the lower extremities. Cutaneous sensibility of the legs and the reflexes were well preserved. The descending galvanic current produced slight contractions when the current was closed and not when it was open. The contractions were weaker in the flexors than in the extensors, and a fragment of muscle excised and placed under the microscope showed a diminution in the transverse markings and some evidences of fatty degeneration. In some cases reported by Giorgieri the tendon reflexes were increased, and Proust believes that there is first produced a transverse myelitis or hæmorrhage of the spinal cord leading to secondary degeneration of the posterior columns, although if this is the case it is difficult to understand how Cantani could have noted no lessening of sensibility. Strümpell believes that the lateral columns are affected, because in the cases seen by him the symptoms were those of spastic spinal paralysis.

*Meco-Narceine*.—Laborde and Duquesnel<sup>10</sup> have made a series

of interesting studies in regard to this substance. It will be remembered that narceine is one of the alkaloids of opium and possesses very marked hypnotic properties. Heretofore it has not been much employed, owing to the fact that it is difficult of manufacture and when made is insoluble in water. Laborde has, however, made a preparation which is free from morphine, but which consists of narceine to which some unknown alkaloid clings. This preparation he has called meco-narceine, and he states that while its hypnotic powers are very great its lethal influence is *nil*.

When one or two centigrammes (one-sixth to one-third grain) are injected into a dog weighing ten or twelve kilos (twenty to twenty-four pounds) the animal falls into a deep, quiet sleep, from which it wakes fresh and cheerful—unlike the after-effect produced by morphine. Meco-narceine produces a diminution of the general sensibility, which is not observed after the use of pure narceine. When meco-narceine is freed from the unknown alkaloid which clings to it chemically pure narceine is obtained, which is insoluble and does not possess the good properties of meco-narceine. The slowing of the respiration and circulation produced by meco-narceine, as well as the fall in arterial blood-pressure and in temperature, shows that a certain degree of anæmia of the nerve-centres is the cause of the effects produced. Laborde employed meco-narceine in the form of pills containing one-twelfth to one-sixth of a grain, by hypodermic injection (one-twelfth of a grain to about fifteen minims), and in the form of a syrup in the proportion of one-sixth of a grain to three-fourths of a fluidounce. He regards the chief indications for the use of the drug as sleeplessness, bronchial affections in which cough and secretion form the chief symptoms, neuralgia, and as a substitute for morphine in morphine-takers. The dose may be increased without harm up to one-third, one-half, and even two-thirds of a grain a day.

*Mercury.*—Several articles of importance on the diuretic action of mercury have appeared during the past year, written chiefly by German and French observers. One of the most prominent of these papers is that of Rosenheim,<sup>114</sup> from which it is possible to derive much interesting information.

Taking the dog as a basis for his experiments, Rosenheim used animals of from twenty-eight to forty kilogrammes (fifty-six

to eighty pounds) in weight, and placed them under the following conditions: Having the animal under very light ether narcosis, the blood from the trunk of the innominate was withdrawn, beaten, and filtered through gauze. After this was done, the skin of the belly in the linea alba was incised and the left kidney made free. A small glass cannula was rapidly passed into the renal artery, the renal vein, and the ureter, and made fast in those vessels. The fatty capsule was now removed, and the organ inclosed between two layers of muscle to protect it from drying, and a wire net placed around the mass, which was then placed in a water bath at 40° C. (104° F.). The fibrinated blood was placed in a glass reservoir which was in a water bath at 40° C., and the defibrinated blood was passed through the renal artery till all air was displaced. The pressure of the blood-stream was now gauged by a U-shaped tube filled with mercury, and the experiment begun, mercury being placed in the artificial blood-stream.

The results of Rosenheim's work, he thinks, show us that mercury when acting as a diuretic does so not by any influence on the heart nor on the skin, but by stimulating the renal epithelium in conjunction with flushing of the blood-vessels. These experiments are so crude in their technique that we can hardly accept them as anything except collateral evidence concerning the matter, but they are interesting as showing experimentally how the drug may produce increased renal secretion.

Laplace<sup>327</sup> finds that solutions of the bichloride of mercury in the proportion of 1 : 1000 do not completely kill the germs with which they come in contact. He attributes this to the formation of insoluble compounds of the albuminate of mercury ; as a consequence the author recommends the following solution for the washing of wounds : Bichloride of mercury, one part ; tartaric acid, five parts ; distilled water, one thousand parts. For antiseptic dressings he recommends that the bandages, linen and cotton, should be steeped in the following solution : Bichloride of mercury, five parts ; tartaric acid, twenty parts, and distilled water, one thousand parts. The cotton should remain about two hours in this solution and afterward be dried, and Laplace has found by clinical experience that such a dressing is much more efficacious than that ordinarily applied.

M. F. Balzer and Mlle. Klumpke<sup>92</sup> have during the past

year made a long series of observations at the Lourcine Hospital, in Paris, on the amount and rapidity of the elimination of mercury by the kidneys during a treatment of long standing. It is generally supposed that the bichloride is held in solution as an albuminate of the oxide of mercury united with sodium chloride, but others have asserted that metallic mercury in a state of minute subdivision circulates in the blood; this point, however, cannot be considered settled, and the drug undoubtedly accumulates in all tissues, more especially the liver and kidneys. It is also well known that it is eliminated by almost all the secretions, notably the milk. While there are many methods for the estimation of mercury in organic fluids, these investigators throughout adopted that of Witz, as modified by Souchow and Michaelowsky, which permits of the easy detection of a one-thousandth of a grain in an ounce. After a single dose of mercury its elimination is rapid and sometimes complete in twenty-four hours, but if a continuous treatment is interrupted its excretion continues for some time, and Küssmaul and Gorup-Bésanez have found it in the liver as much as a year after its administration had been stopped. The amount of mercury that can be steadily eliminated for many weeks from the kidneys when the body is saturated is about a sixteenth of a grain (0.0041 gramme).

The practical conclusions to be drawn from these researches is that it is well to stop the administration of mercury when the amount eliminated by the urine has reached its normal maximum.

*Naphthaline*.—Our corresponding editor, Dr. Meyer, of Naples, calls attention to the studies of Pernice,<sup>589</sup> who has found that naphthaline has a checking action on the development of the comma bacillus and, therefore, recommends it in the early stages of cholera.

*Nerium Odorum, or Oleander*.—Although for many years many of the symptoms produced by this plant have been known to the profession, and although Reichard, du Barry, Kurzak, Orfila, and others have studied its action from time to time, within the past year Pouloux<sup>597</sup> has made still further investigations concerning it. He finds that in doses of five centigrammes ( $\frac{3}{4}$  grain) the extract produces in the frog paralysis and death in from thirty-five to forty minutes, and that the ventricle is thrown into a state of tetanus so that the diastole is incomplete. Finally, the heart

stops in systole, but the auricles continue to beat for some time. The lethal dose for the rabbit is about seven and one-half grains (0.49 gramme) of the alcoholic extract, death coming on in about forty minutes, and it is worthy of remark that in this animal the heart continued to beat some minutes after respiration had ceased. Notwithstanding this fact, however, Pouloux attributes the death to the cardiac failure. From these researches it would appear that oleander belongs to the digitalis group of drugs, but a wider study is as yet necessary before we can regard this as a positive fact. Clinical studies made by Pouloux under the care of Dujardin-Beaumetz seem to show that the drug was of value in cardiac disease, strengthening the heart and relieving dropsy by increasing the renal secretion; the dose of the extract was three-fourths of a grain (0.05 gramme) in pill form.

*Nickel*.—Riche<sup>850</sup><sub>Nat.</sub> has recently investigated the question as to the toxic influences of nickel upon the system, and concludes that the metal may be used for holding or preparing articles of food. He gave two guinea-pigs during ninety-six days 26.3 grammes (seven drachms) of the sulphate of nickel in quantities gradually increased from 0.025 to 0.250 gramme ( $\frac{1}{4}$  to  $3\frac{3}{4}$  grains) daily without any noticeable effect. A dog during thirty days took with his food salts of nickel corresponding to five grammes (seventy-five grains) of the metal with a like result, and another dog took during one hundred and sixty days 100.75 grammes (three ounces) of nickel sulphate, equaling 21.25 grammes (three hundred and twenty-four grains) of the metal without harm. As long as the quantity did not exceed 0.5 gramme (7.5 grains) daily no effect was noted, but if a larger dose was given gastro-intestinal disorders resulted. After death nickel was found in every portion of the body, the largest amount being in the liver and nervous tissue. The metal could always be found in the excretions. Still more recently Laborde and Riche<sup>850</sup><sub>Nat. 1 & 2</sub> have injected large doses of the salts of nickel into the veins, producing lowering of temperature, general weakness and stupor, but never death.

*Ouabaine*.—Gley<sup>6</sup><sub>Aug. 25</sub> has made a large number of experiments on frogs, guinea-pigs, rabbits, and dogs, in order to discover the action of ouabaine, an alkaloid from the wood of ouabäio. He finds that its action is almost identical with that of strophanthine, but that it is far more toxic, being twice as poisonous to the

frog and rabbit, thrice as poisonous to the dog, and four times as poisonous to the guinea-pig. It causes death by cardiac arrest.

*Papoid Digestion.*—Ruttan<sup>9</sup><sub>v.1,p.422</sub> has reported the results of his studies in regard to this substance, with the object of reconciling some of the hitherto discordant conclusions obtained by others. He finds that papain contains a proteolytic ferment, which is most active in neutral and alkaline solutions, its maximum activity being seen in a solution of 2 per cent. of sodium carbonate. If HCl is added up to the strength of 3 per cent., papain loses all digestive power. In neutral solutions he finds that it exceeds pancreatin and pepsin in proteolytic power. The advantage in its use is that while it may remain inactive in the stomach it asserts itself as soon as the food containing it reaches the small intestine.

*Phosphorus.*—Kissel, of St. Petersburg,<sup>6</sup><sub>Dec.24,75</sub> finds that phosphorus does not benefit the growth of bone in young animals and frequently disorders digestion. Given to puppies in the dose of 0.0001 gramme ( $\frac{3}{8000}$  grain) per kilogramme (two pounds) of weight, symptoms of chronic poisoning were produced, with atrophy and disintegration of the bones. In doses of half this amount the development of the animal was retarded, but those equal to 0.000033 gramme ( $\frac{1}{8000}$  grain) per kilogramme of weight appeared to be innocuous and produced no effect at all upon the body.

These results are so absolutely opposed to the studies of Wegner, which have heretofore been thought authoritative, that they must be received with great reserve and doubt.

*Potassium Bromide.*—Agostini<sup>376</sup><sub>May</sub> published a research on the effect of this drug in the elimination of urea. He found that after taking the drug the urea excreted was much lessened (28.81 grammes as against 30.01 grammes in twenty-four hours), but that the reduction in the amount of urea is not in direct ratio with the amount of the drug ingested.

Agostini believes that ill effects do not follow the prolonged use of bromide of potash because tolerance is established, and he goes on to say that large doses may be used indefinitely without ill effect, which is, of course, absurd.

*Pyrodine.*—Wild<sup>80</sup> has found that this substance is without effect on the voluntary muscles, while upon the heart muscle in large amounts it acts as a depressant and lowers blood pressure by a direct action on the vasomotor centre and not by any influence

over the blood-vessel walls. On the spinal cord Wild finds that it acts as a depressant, lowering reflex action by its direct effect and not by acting on the nerve-trunks.

*Sedum Acre.*—Jüngst<sup>273</sup> finds that the following changes are produced by this drug: Having first prepared a salt from it by the use of hydrochloric acid, he used a solution in his experiments of the strength of one gramme (fifteen grains) to five cubic centimetres (eighty minims) of water. When one-half cubic centimetre (eight minims) of this solution was injected into a medium-sized frog of the species known as *Rana esculenta*, the animal moved about in a heavy manner, and two minutes after the injection failed to right itself when placed on its back or to react when the skin was pinched, the extremities were spasmodically drawn up, and the pupils were contracted, reflex action was entirely lost, the eyes became closed, and death occurred from respiratory failure. The heart continued beating for some time after respiration ceased. In the higher animals, as represented by the rabbit and cat, the same dose, one-half a cubic centimetre (eight minims), produces exceedingly rapid respiration, with widely dilated pupils, followed by irregular breathing and closure of the eyelids, the animal lying on its side. Later, recovery takes place so that the creature is in health on the following day. If the dose be larger death occurs, as in the frog, from failure of respiration, preceded by cramps in the extremities and marked dyspnoea. Given to man hypodermically, in the form of the tincture, it causes headache and sleepiness, which increase rapidly in intensity with slight increase in pulse-rate and that of the respirations. The next day there is headache still, with some nausea and unrest, which generally persist for forty-eight hours.

*Senecio Canicida.*—This drug produces poisonous symptoms which may be divided into three different stages<sup>392 July 1</sup>: A stage of excitement, one of collapse, and one of convulsions. Accompanying these symptoms there is, without exception, a rise of bodily temperature. It produces death by paralysis of the respiratory centre and acts most powerfully when given subcutaneously. It paralyzes the sphincters of the bladder and rectum and irritates unstriated muscular fibre wherever it is found in the body.

*Solvine.*—This substance receives its peculiar name from the fact that it has a power of dissolving certain substances usually

considered insoluble, as, for example, iodoform.<sup>116</sup><sub>Dec. '97</sub> The great difficulty in its employment, which virtually amounts to a contra-indication, is that it is easily absorbed through the skin and, when such a result occurs, immediately dissolves the red blood-corpuscles. As this probably takes place only when excessive amounts are used, the substance may come into general use in pharmacy and therapeutics.

*Strophanthin*.—Popper,<sup>365</sup><sub>Nov. '97</sub> as the result of a series of studies on curarized dogs in Vienna, has, by the use of Merck's strophanthin, reached the following conclusions:—

1. The arterial pressure is raised. This is chiefly to be referred to a change in the cardiac action, for it occurs if vasomotor palsy is previously produced and the peripheral capillaries do not contract.

2. There is an increased venous pressure *pari passu* with the arterial change, but the venous changes are inconstant.

3. The drug, late in its action, may paralyze the vagi, but the accelerator nerves remain intact throughout.

*Sulphonal*.—Examination of the effects of sulphonal on the blood pressure by von Kries has established the fact that in dogs, even after very large doses, the blood pressure is not lowered, while poisonous doses cause severe convulsions, passing into heavy sleep, deepening into coma, and ending in death in about ten hours. On man it seems to produce deep and tranquil sleep, without any disturbance of the digestion, pulse, or temperature, and Kast<sup>41</sup><sub>No. 34</sub> has found that as much as forty-five to sixty grains may be taken by healthy adults without any disagreeable after-effects or discomfort. The same observer has noted that when given to dogs in doses of thirty grains it produces want of co-ordination in the movements of the extremities, followed by sleep. It was also found that this inco-ordination persisted even after the animal had awakened.

*Toad Poison*.—Meyers, of Naples, corresponding editor, calls attention to the researches of Albertoni<sup>569</sup><sub>No. 192</sub> upon this substance. In moderate doses the poison produces slowing of the pulse, with prolongation of the systolic excursion. If a large amount is given, the blood pressure is increased and the heart is stopped in systole. There is also at this time marked contraction of the blood-vessels. Albertoni, therefore, concludes that toad poison belongs to the same group as digitalis, and this is confirmed by Podrecca, who asserts that in man this poison acts as does digitalis.



*Turpentine*.—Brémond<sup>363</sup><sub>Apr. 27</sub> reports the influence of this drug on the richness of the blood in hæmoglobin, and upon the activity of reduction of the oxyhæmoglobin. Taking three consumptive patients he gave turpentine, and Henocque examined the blood.

The oxyhæmoglobin was increased in amount, the bacilli decreased in number, and the general nutrition improved. As a result the conclusion is reached that turpentine improves nutrition by aiding in bodily oxidation.

*Urechites Suberecta*.—This plant has already been studied by Ott and Vowinkle. Recently, Minkiewicz<sup>80</sup><sub>Aug.</sub> has still further studied it, and has found that the heart was markedly slowed by an action on the heart ganglia of a paralytic type and not through vagal influence. The gastro-intestinal mucous membrane is swollen and inflamed by it, and minute hæmorrhages occur in the kidneys. The vomiting which it produces is centric. The statement of Vowinkle, that the drug is an antidote to curare is erroneous, according to Minkiewicz.

*Uranium*.—Chittenden, of New Haven, Conn.,<sup>50</sup><sub>v. 2, p. 222</sub> presented to the American Society of Physiologists the result of his studies upon the salts of uranium. Previously he had reported that all the uranyl salts, with one or two exceptions, have a more or less marked inhibitory influence on amylolytic and proteolytic action.

His later results show that uranium is an irritant poison, and that it, like other metallic irritants, produces gastro-intestinal irritation of more or less intensity, resulting in most cases in a simple enteritis, but often becoming an acute catarrhal inflammation. As a poison it acts slowly, and one hundred and fifty milligrammes appears to act as vigorously as a gramme (15.4 grains). In rabbits the first marked symptom is general weakness with loss of co-ordination, and occasional temporary paralysis of the locomotor muscles. Introduced into the stomach, it checks digestion. It increases proteid metabolism and the excretion of carbonic acid, and causes a rise of temperature. Its effect on nutrition is shown by rapid emaciation. The most marked lesion is seen in the kidney, where it produces acute parenchymatous nephritis. The large amount of albumen found in the urine shows how greatly the blood-vessels are involved. Small doses cause at first an increased quantity of urine, but toxic doses result in complete suppression. A short time after administration of the drug, more or less sugar is found in the urine; this

generally does not come until after albumen has appeared. The production of glycosuria is a very characteristic symptom in uranium poisoning. The urine invariably contains large amounts of calcium oxalates, which also points to decided malnutrition and helps explain the marked emaciation so commonly seen. In cases where the poisoning became chronic the nervous symptoms sometimes predominated, as was shown by loss of sight and power of co-ordination.

*Vaseline.*—Léon Petit, for MM. Cadéac and Albin Meunier, communicated to the Société de Médecine Pratique<sup>14</sup> the results of studies on the absorption of vaseline. They conclude that vaseline is, in medicinal dose, completely absorbed and destroyed in the body, and that in large doses it may be found in the blood and urine. They also find that drugs associated with it are always absorbed but delayed in their absorption.

These results are so opposed to all our experience as to require confirmation. Balzer thinks it is not absorbed; Roussel, that the substance may be seen in globules in the blood, while Grandmont uses it hypodermically to carry peptonate of mercury and obtains rapid absorption.

*Vernonine.*—Heckel and Schlagdenhauffer<sup>10</sup> have studied this principle, derived from the *Vernonica nigriliana*, an African plant.

It is one-eightieth as strong as digitalis. While their experiments do not warrant any great value being attached to it, they believe it to be a possible substitute for foxglove.

*The Rapidity of Absorption of Certain Medicaments.*—Choupe<sup>3</sup> has published the results of a series of experiments to determine these points. He finds that apomorphine given hypodermically to dogs acts in from four to five minutes. Cocaine, similarly administered, acts in about twelve minutes, if given in large enough doses to produce convulsions. Strychnine, as used in such a dose as to be fatal, causes convulsions in twenty minutes in the dog and twenty-five minutes in the guinea-pig. He also found that there is very little difference in the rapidity of absorption in different animals of the same species. There is much difference, however, in the rapidity of absorption of weak and strong solutions, even if care be taken to inject them into the same part of the body.

The practical conclusions drawn from these investigations are that a fairly prolonged interval should be allowed to elapse after a dose given hypodermically before a second one is administered, and that a disregard of this rule is liable to produce dangerous results.

*Circulatory Changes in the Kidneys under the Influence of Drugs.*—Smirnow<sup>31</sup><sub>7,25</sub> has carried on a series of laborious experiments in the laboratory of Botkin in St. Petersburg, and the results of his research regarding the action of cardiac remedies on the kidneys have led him to the following conclusions: 1. Injections of infusion of digitalis, adonis vernalis, and convallaria majalis in moderate doses increase the pressure of blood in the kidneys and decrease the renal volume. This contraction of the kidneys continues as long as the pressure remains high. As the latter decreases (or a little before) the kidney will gradually increase in size and finally become much larger than it normally was, the process taking from three-quarters of an hour to an hour. 2. It was also found that when the same drugs were given at the moment of contraction of the kidneys the secretion of urine stopped entirely and did not begin again until the organ increased its volume, the increase in secretion being always in direct ratio with the enlargement of the kidney. 3. Section of the renal nerves in no way prevents the action of these remedies save that the dilatation of the kidney is not quite so complete. Neutral salts, such as nitrate of potash and acetate of potash, cause similar changes in the circulation of the blood in the kidney, but affect the blood pressure differently, causing it to sink slightly at first.

Similar studies have been made by Munk.<sup>315</sup><sub>7,7</sub> In all those experiments in which a successful result was obtained he passed defibrinated blood through an excised kidney, within fifteen minutes after its extirpation, the proper pressure and velocity of the current being so arranged as to represent as nearly as possible that found under ordinary conditions.

If the sulphates or phosphates of any of the alkalies be added to defibrinated blood the liquid secreted contains much more of these salts than the blood-serum, and if sugar is added to the blood a much larger amount of sugar is found in the secretion than existed in the volume of blood which has passed through the kidney.

Munk notes the important point that increase of pressure during the passage of the liquid has no influence in increasing secretion unless at the same time the velocity of the current is also increased.

With urea more than twice as much blood traversed the kidneys within an hour, and nearly four times as much urine was secreted. By increasing the quantity of sodium chloride the quantity of urine within the next hour was increased from eight and one-half to fifteen fold without the velocity of the blood-current being increased. The secreting epithelium of the kidney is greatly stimulated under the influence of common salt. Nitrate of soda and potash have an effect similar to that of common salt, to a less degree, while caffeine, besides causing a dilatation of the renal blood-vessels and increased speed of the blood-current, powerfully stimulates the secreting cells to greater activity. If sugar is given in very large amounts it acts as a diuretic.

Under the influence of pilocarpin, the velocity of the blood-current increases much more rapidly than through any one of the above-mentioned drugs, and at the same time the effect is of longer duration. The increase in the quantity of urine is in the proportion of 1 to 6, and is certainly partially dependent on direct excitation, through the pilocarpin introduced with the blood.

Quinine is without action in doses of 0.025 per cent. present in the blood. With 0.04 per cent. the blood-current rises one and one-fourth to two and one-fourth fold.

Digitalis fails to stimulate perceptibly the velocity of current or the secretion of urine in excised kidneys, the doses being of medium or of larger size. Its diuretic action, therefore, is only attributable to its action on the heart, on the general blood pressure, and on the velocity of current in the arterial system, and not to a direct excitation of the renal epithelium.

Under the influence of large doses of morphia the urinary secretion is reduced by about one-half its quantity, and the velocity of the blood-current is reduced by about two-thirds. Atropine seems to possess no action either on the velocity of the blood-current or on the secretion of urine. Strychnine directly induces contraction of the renal vessels and diminishes the velocity of the blood-current through the kidneys. To establish the conditions for the synthetic processes in the kidneys, colored blood with an addition

of benzoic acid and glycol was caused to traverse the surviving kidney, and one hundred and seven grammes (over three ounces) pure hippuric acid were formed. The red blood-corpuscles do not play any important part in this production, they only act by the oxygen they contain. Another result obtained was the successful formation, in the surviving kidney, of ethereal sulphuric acid from phenol and sulphate of soda, although in a small proportion. In this case, again, the blood-corpuscles act by virtue of the oxygen present in them, and in this function may be replaced by oxy-hæmoglobin in solution.

*Action of Various Drugs on the Heart.*—During the latter part of the year 1887, too late for inclusion in the ANNUAL of last year, Rummo and Ferranini<sup>616</sup><sub>1887</sub> read a paper at Pavia on this subject. Their experiments were made upon frogs, toads, crustacea, guinea-pigs, rabbits, and dogs, tracings being taken from the hearts of each of these animals. The drugs which they experimented with were digitalis and digitalin, strophanthus and strophanthin, upas antiar, helleborin, erythrophlæine, oleander, spartein, caffein, adonidin, and convallaramin. They observed that these drugs first diminished the frequency of the cardiac pulsations and augmented the blood pressure in all the animals named, but that in a later stage, after a toxic dose, they disordered the rhythm of the heart and diminished the blood pressure. If the dose was large enough to produce death all these drugs arrested the heart in cold-blooded animals in diastole, but in the warm-blooded animals in systole. This is particularly interesting in view of the fact that many pharmacologists have asserted the contrary to be true. As regards the mode of action of the drugs used, it was found that strophanthus and its alkaloid, helleborin, digitalis, erythrophlæine, upas antiar, and oleander chiefly influenced the heart muscle primarily and the cardiac nerves secondarily. On the other hand, adonidin and convallaramin simultaneously influenced both the nerves and muscles, whereas spartein and caffein chiefly affected the cardiac nerves, and the heart muscle little or not at all. Here again the results reached are not in accord with our earlier ideas upon this subject, since it has heretofore been supposed that caffein expended its entire influence upon the heart.

These investigators have also confirmed the opinions already generally received in regard to this class of drugs, namely, that

they raise blood pressure not only by increasing the force of the heart but also by stimulating the vasomotor centre. They also conclude that only these drugs which influence the cardiac nerves produce disturbances in the general nervous systems.

*Intravascular Injections in Collapse.*—Diakonoff,<sup>6</sup> has made a number of experiments on ten healthy dogs with the object of testing the value of intravascular injections of common salt to which a little alkali has been added in the condition known as collapse. In these animals collapse was produced by administration of chloroform, and as soon as a dangerous condition was approached a small quantity of Schwarz's solution, which consists of chloride of sodium six grammes, caustic soda .05 gramme, in one thousand grammes of distilled water, was injected into the distal end of the femoral artery or into the proximal end of the femoral or jugular vein. The results obtained were in the highest degree satisfactory, Diakonoff asserting that where the heart had apparently stopped contractions were by this means brought about, and that the respiration also improved in character. Where the chloroform was pushed beyond a certain point all means naturally failed.

*Synergetic Effects of Toxic Drugs.*—Roger,<sup>41</sup> taking morphine, atropine, quinine, and chlorate of potash as his armamentarium, endeavored to determine whether the lethal dose of one was modified by the simultaneous use of another drug. Using intravenous injections, he comes to the startling conclusions that atropine and morphine combined are more poisonous than either alone, and the same was true of quinine and atropine, and also of quinine and morphia. The potency for evil exercised by chlorate of potash and morphine is double that of the sum of the two together. Roger could not see that any of the above were in any way antagonistic.

*Physiological Action of Pigments.*—Studies as to the effects of synthetical pigments have been made by Weyl<sup>22</sup> of the so-called "nitrous" compounds limiting himself to the  $\beta$  naphthol (green). He found that it was innocuous when administered to dogs in doses of one or two grammes (fifteen to thirty grains) daily for a fortnight. Of the "nitro" compounds the dinitro-creosol or saffron substitute is also non-injurious. Martin's yellow, or dinitro- $\alpha$  naphthol, although borne well by rabbits, killed dogs, even in

small doses. On the other hand, a sulpho-acid of Martin's yellow, sold as naphthol yellow, proved harmless even in large doses. Picric acid was, of course, found to be poisonous, and three preparations of saffranin were also found to possess toxic power.

*Influence of Drugs on Digestion.*—Fowler<sup>1160</sup> has carried out a series of experiments to ascertain the influence of certain drugs upon the digestive process, and finds that the following remedies retard digestion when brought in contact with the process in the test-tube: Twenty grains of soda salicylate inhibit it for many hours, while three grains retard it for two hours. Twenty grains of quinine (sulphate) stop it for over six hours, five grains retard it very slightly, and three grains do not retard it at all. Curiously enough, he found that fifteen minims of the tincture of the chloride of iron had a very decided inhibitory action, and five drops checked digestion for fifteen minutes. Correspondingly, twenty grains of prepared chalk actively retarded digestion, but ten grains of salol caused very slight delay. He also determined that chalk mixture, tincture of kino and of catechu, either delayed or entirely prevented the action of the gastric juice. On the other hand, antipyrin, antifebrin, mild chloride of mercury, and the bi-chloride, as well as resorcin and small quantities of acetate of lead, were all without effect.

*The Douche as Affecting Blood Pressure.*—Vishegorodski,<sup>6 Feb. 21</sup> a Russian regimental surgeon, reports in a graduation thesis the results of a series of experiments made by him to determine the effects of the general douche at different temperatures on the blood pressure, pulse, respiration, and temperature. The experiments were conducted in the Krasnoselski Military Hospital, the eleven subjects being "feldshers" (hospital orderlies). The water was obtained from a reservoir fifteen feet above the floor of the bathroom, and it was conveyed by means of two tubes, each about three-quarters of an inch in diameter, to the body of the subject. One of these tubes dispersed the water in the form of spray, while the other gave off three jets, one of which struck the body over the hypochondrium, the second over the spleen, and the third upon the back. The stream was allowed to play upon the body for two minutes, and the blood pressure was estimated by the sphygmomanometer of Basch. Vishegorodski found that with douches of from 63° F. to 90° F. (17° C. to 32.22° C.) the blood pressure was

considerably increased, but that douches of from 100° F. to 114° F. (37.77° C. to 45.55° C.) considerably diminished it. It was also found that the increase in pressure when it occurred persisted for some time, not returning to the normal for more than an hour, and it was also noted, very naturally, that the variations in the blood pressure occurred simultaneously with the variations of the cardiac beats, the latter becoming slower as the blood pressure rose and more rapid as it fell.

It should not be forgotten that this research brings to us results opposed to those of Delmas, who, however, judged of the pressure merely by the sphygmograph. Douches of a little over 90° F. (32.22° C.) produced scarcely any effect on the blood pressure, the pulse, or respiration, probably because water at this temperature gives no shock to the body.

*Effects of Wet and Dry Packing.*—Gritsai,<sup>2</sup> of St. Petersburg, has carried out a series of observations as to the influences of wet and dry packs followed by vigorous rubbing, the persons experimented on being a number of healthy hospital attendants. It was noted that the pulse-rate was decreased slightly in both instances, amounting to six beats per minute after a wet pack and three beats per minute after the dry pack. It was also attempted to determine any change in the arterial pressure by Basch's sphygmomanometer, and as a result Gritsai asserts that a rise occurred equal to eight millimetres after the wet packs, but that the dry packs produced a fall amounting to five millimetres. Using Waldenburg's pneumatometer, it was found that inspiratory and expiratory force was nearly twice as great with the wet as with the dry packs.

Observations concerning the condition of muscular force showed it to be increased by the wet and slightly decreased by the dry. Studies upon the bodily temperature showed that both the rectal and axillary temperature were decreased, the rectal temperature falling most when the dry pack was used; thus the fall of temperature in the rectum after the wet pack equaled 0.15° C. (0.27° F.), and 0.27° C. (0.486° F.) with the dry pack. The temperature in the axilla, on the other hand, was more affected by the wet pack, which caused it to fall 0.18° C. (0.324° F.), while the dry pack only caused it to fall 0.07° C. (0.126° F.). The surface temperature, as registered by Immisch's thermometer, fell



in both classes of experiments. The temperature of the chest fell  $0.48^{\circ}$  C. ( $0.864^{\circ}$  F.), and that of the thigh  $0.6^{\circ}$  C. ( $1.08^{\circ}$  F.) after wet packing, the dry packing producing a small fall in both cases, viz.:  $0.24^{\circ}$  C. ( $0.432^{\circ}$  F.) on the chest and  $0.2^{\circ}$  C. ( $0.36^{\circ}$  F.) on the thigh.

*Effect of Cooking on the Digestibility of Starch.*—N. Butiagin<sup>6</sup> finds that the strength of saliva does not vary much in healthy persons, but that it is weakened in debility and similar states. When starches are subjected to prolonged cooking their digestibility is increased, and in this way compensation for weak saliva may be brought about. Thus, three hours' cooking made rice and peas as easily digested by a sickly woman, whose saliva had been proved to possess only 88 per cent. of its normal activity, as did an hour's cooking make them for a healthy person. Starchy food. Butiagin asserts, must be cooked three or four times as long for an invalid as a well person.

*Therapeutics at a Distance.*—It will be remembered that Luys astonished the French Academy last year by stating that by holding medicines near the bodies of hypnotized subjects he could produce their physiological effects. Thus, he sent a patient into convulsions with strychnia, and made another tipsy with a drachm or so of brandy used in this way. A committee of investigation, composed of Hérard, Bergeron, Brouardel, Gariel, and Dujardin-Beaumetz<sup>67</sup> was appointed, and have shown the utter absurdity of his claims.

Sixteen tubes were prepared by M. Vigier, a pharmacist, not present at the experiments, and by him simply marked with numbers corresponding to sealed envelopes in which the true name was inclosed. Ten of the tubes, or homœopathic vials, exactly like those employed by Luys, contained each ten grammes (one and one-half drachms) of a medicinal solution; six tubes, covered with white paper, held various powders; and, finally, one empty tube, similarly covered, was added by the committee.

The woman having been hypnotized by Luys, the tubes were brought into play as formerly, but the committee avoided the error of outside experimenters, who had named in the hearing of the patient the effects expected from each drug. If the theories were correct the patient should be able to show the characteristic symptoms without any suggestion. But the woman went all astray.

The first thing to strike the committee, before opening the sealed envelopes, was the similarity of effects observed with all the vials—the application of the tube to the left side of the occiput causing symptoms of terror, sorrow, and repulsion, while to the right side, laughter, joy, and satisfaction was experienced. Another point also impressed the committee—namely, the action of the empty tube.

We have given space to this matter because it is an interesting example of how readily mistakes are made even by well-meaning observers.

*The Physiological Action of the Toxic Bases of Normal Urine.*

—Pansini, of Naples, corresponding editor, sends the following extract of an article by Adduco, who finds that:—

1. From human urine passed before, during, and after fatiguing muscular exercise an azotized base may be extracted having the general properties of alkaloids.

2. This base is produced in the larger quantity during fatigue, and in the lesser quantity during the period of uninterrupted nocturnal rest and sleep.

3. The hydrochlorate of this base displays great toxic energy. In cold-blooded animals it has a depressing action; in warm-blooded animals it is more active and gives rise to general phenomena of excitation. Non-fatal doses rapidly exhaust both cold- and warm- blooded animals.

4. The ethero-alkaline extract of urine passed before, during, and after fatigue is made up of one and the same substance; that is to say, it has certainly the same chemical reaction and the same physiological action.

5. These chemical and physiological properties exclude the idea that the said base is either neurin or cholin.

*The Action of Medicaments on the Biliary Secretion and their Elimination by this Secretion.*—One of the most thorough researches which have ever been carried out upon this somewhat difficult subject has been published during the year 1888, the investigators being MM. Prevost and Binet.<sup>197</sup> Not only does the research seem to have been surrounded by all those conditions which are essential to success, but the authors have also included a very large number of drugs, among which are salicylate of soda, antipyrin, Carlsbad salts, terpine, pilocarpine, benzoate of soda,

essence of turpentine, terpinol, iodide of potash, bromide of sodium, urea, cathartic acid, rhubarb, euonymus, tincture of cochineal, hydrochlorate of quinine, fuchsine, ether, salol, phosphate of soda, citrate of ammoniated iron, boldo, caffeine, sulphate of copper, colombo, hydrastis, propylamine, hydrochlorate of trimethylamine, calomel, strychnia, corrosive sublimate, chlorate of potash, bicarbonate of soda, ipecac, chloride of lithium, arseniate of soda, and in addition to all these they have studied the influence of food.

The conclusions which they draw are as follow :—

“ 1. In confirmation of the experiments of Ruhmann, our animals with the biliary fistulæ have been kept in good health by excluding from their food all fats, which pass out almost in their entirety in the stools, where their presence is very easily detected.

“ 2. The quantity of bile augments somewhat with food, especially after the ingestion of peptones. Fats, on the other hand, do not produce any augmentation in the flow of bile. Cold or warm water only produce slight increase in quantities of one hundred and fifty cubic centimetres (five ounces) to two hundred cubic centimetres (six ounces, six drachms). Copious lavements of cold water, recently recommended in jaundice, do not modify the biliary secretions.

“ 3. As to the elimination by the bile of medicaments introduced into the organism, we find that this is always inconsiderable.

“ 4. There is no constant relation between the elimination of a substance by the bile and the effect which it may have in increasing biliary secretion.”

Prevost and Binet also divide the substances which we have mentioned into several groups :—

The first group augment the biliary secretion, and consist in bile and its salts, urea, turpentine and its derivatives, terpinol and terpine, chlorate of potash, benzoate and salicylate of soda, salol and euonymus, and muscarine given hypodermically.

The second group augment the bile inconstantly, and consist in bicarbonate and sulphate of soda, common salt and Carlsbad salts, propylamine, antipyrin, aloes, cathartic acid, rhubarb, hydrastis, ipecac, and boldo.

The third group diminish the secretion, and are iodide of potash, calomel, iron and copper, atropine and strychnine.

The fourth group contain the remaining drugs which we have mentioned.

## TOXICOLOGY.

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*Alkaloids, their Resisting Power Against Putrefaction.*—Pellacani<sup>501</sup> gives an account of some experiments made for the purpose of determining how various poisonous substances resist putrefaction. The following was the method adopted: A fixed quantity of the poison having been introduced into a definite quantity of blood (two hundred and fifty cubic centimetres) drawn from the same animal, the mixture was allowed to putrefy under favorable conditions of temperature. From time to time it was tested for the poison. The poisons experimented with were for the most part vegetable alkaloids, which were introduced in a free state in the following proportions relatively to the blood: 0.10 in the case of physostigmine, atropine, pilocarpine, daturine, and digitaline, and 0.50 in the case of all other substances. No trace of digitaline or santonin could be found in the putrid liquid after four months, while atropine, codeine, daturine, and physostigmine took thirteen months to disappear. Morphine and picrotoxine gave signs of their presence after twenty-seven months; aconitine and cicutine were still present in considerable quantity after thirty-four months, and veratrine was found at the end of thirty-nine months. As regards curarine, it remained unaltered for twenty-eight months, but after thirty-nine months the physiological test gave a negative result, although the characteristic reactions still persisted, except with the sulphuric acid test. Pellacani considers that these experiments prove that putrefaction is not so rapidly destructive of vegetable poisons as has hitherto been believed. This is particularly the case with alkaloids.

*Aniline.*—The following case is reported by Dehio<sup>4</sup>: A young woman, recently delivered, swallowed ten grammes (3 2½) of aniline. The symptoms, quickly manifested, were cyanosis, acceleration of pulse, dilation of the pupils, and aniline odor of breath. The immediate effects on the nervous system were shown

(C-1)

in twenty-four hours by coma, absence of cutaneous reflexes, and voluntary motion; pulse 132, respiration 25, and profuse transpiration, the latter occurring thirty hours after ingesting the poison. On the second and third days the improvement was marked. Besides the purely nervous symptoms there was an abnormal coloration of the skin. Twenty-one hours after ingestion the urine contained traces of the colorants of the bile and the serum was yellowish-red; from the second to the fifth day the urine contained more and more biliary pigment; on the third day an icterus appeared, which lasted until the ninth. A dark color of the urine from the sixth to the tenth day was due to hæmoglobinuria; the urine afterward became normal. The destruction of sanguineous globules was rapid and formidable; the normal five million per cubic centimetres fell to two million seven hundred thousand on the seventh and one million four hundred thousand on the eleventh days. The globules were replaced slowly; on the eighteenth day their number was about one-third of the normal quantity. Convalescence returned with the disappearance of hæmoglobinuria. Aniline may be classed with those poisons which produce the latter condition simultaneously with icterus.

*Arsenic and Phosphorus.*—Idelson<sup>90</sup> reminds us that the classical researches of Hauff, Munk, and Leyden, Bollinger, Lewin, Zaikovsky, and Dybkovsky, have created the now universally accepted toxicological teaching that phosphorus and arsenic, in poisonous doses, give rise to a more or less intense fatty degeneration of the liver and all other parenchymatous organs. Accordingly, every whitish or yellowish patch or focus met with in the liver at the autopsy in cases of poisoning by the two substances is usually ascribed to fatty degeneration. Recent works on the subject, however, have shown that the matter is not so simple. On one side, Maschka<sup>84</sup> was unable to discover any fatty degeneration in several cases of arsenic poisoning in man which had ended fatally in seven or eight hours. On the other hand, Filomusi-Guelfi,<sup>497</sup> having poisoned a number of guinea-pigs with phosphorus, found in them not only fatty degeneration of the hepatic cells, but also small-sized patches of a new-formed connective tissue, while Cornil and Brault<sup>165</sup> came to the conclusion that phosphorus and arsenic gave rise not only to fatty degeneration, but also to an extensive diffuse necrobiotic process of the hepatic cells.

Recently, Podvysotzky<sup>586</sup> has published an important contribution to the question. The author's experiments consisted in the injection of a 1 per cent. phosphorus oil, or 1 per cent. aqueous solution of arseniate of sodium under the skin of the neck in guinea-pigs, the dose of the pure poison varying from 0.0005 to 0.01 gramme (gr.  $\frac{1}{2000}$  to gr.  $\frac{1}{100}$ ). The results may be summarized as follows:—

1. The injection of 0.0005 to 0.002 gramme (gr.  $\frac{1}{2000}$  to gr.  $\frac{1}{500}$ ), once daily, is tolerated by the animals for several days, and even weeks, but that of 0.003 gramme (gr.  $\frac{1}{333}$ ) causes death in five or six days.
2. A single dose of 0.005 or 0.01 gramme (gr.  $\frac{1}{200}$  or gr.  $\frac{1}{100}$ ) kills the animal in six, eight, or ten hours. No fatty degeneration can be detected in the liver (or any other parenchymatous organs) in these fulminant cases.
3. But on the surface of the organ there are invariably found from three to eight yellowish-white circular or ovoid patches, varying in size from a pin's head to a lentil, and generally somewhat resembling miliary tubercles. On section through the patches it is seen that they slightly penetrate into the deeper layers, forming wedge-shaped or irregular ovoid figures. Similar whitish islets are met with scattered in the hepatic parenchyma. The microscope reveals that *all the patches and islets are nothing else than true necrotic foci developing in the hepatic glandular tissue itself.*
4. *These foci result from a direct toxic action of the poisons* (brought into the organ by the blood-current from the site of the injection) *on the cell-protoplasm.* To all appearance the liver is endowed with quite a peculiar power to retain and accumulate the largest portion of the poisons circulating in the blood.
5. The epithelial lining of the biliary ducts manifests a far more considerable stability or resistance in regard to phosphorus and arsenic than the secretory hepatic cells.
6. When present in the animal's blood in toxic quantities, the poisons cause an extensive destruction of the red blood-corpuscles, with an equally extensive accumulation of clumps and grains of the blood-pigment in the spleen.
7. When the poisoned animals remain alive (after a single injection of large doses, or after daily injections of moderate non-lethal doses for three or five days), the neurotic portions of the hepatic tissue undergo a sequestration process, and gradually decrease in size, to be as gradually replaced by a new-formed connective tissue, as well as by new-formed biliary ducts and new-

formed glandular elements, the latter representing products of proliferation of the adjoining normal hepatic cells. 8. Fatty degeneration of the hepatic tissue commences only about the end of the first twenty-four hours after the introduction of the poison. The degeneration affects not the dead elements of a necrotic focus, but solely those hepatic cells which surround the latter and form a demarcation zone separating the necrotic area from a quite normal hepatic parenchyma. 9. Therefore, *only a still living hepatic cell can undergo a fatty degeneration. An already dead cell cannot be affected by the process.* 10. The above-mentioned circumscribed destruction and mortification of the hepatic parenchyma brought about in a hæmatogenic way can be followed, as we have seen, by a true regeneration of the hepatic tissue; that is, the loss is replaced not only by a new-formed connective tissue, but also by biliary ducts and new sets of hepatic secretory cells; however, the new-formed hepatic tissue does not present the typical structure of an acinus or lobulus of the organ. 11. It is most probable that the same process of destruction and true regeneration takes place also in man under the identical toxic circumstances. Minkh, of Kiev, often found similar circumscribed whitish-yellow islets in the liver at the post-mortem in cases of phosphorus poisoning. Apparently, the same islets were seen also by Klebs, in cases of recent poisoning by phosphorus, though he regarded them as the areas of fatty degeneration of highest degree.

In a comment upon a paper by Silbermann,<sup>89</sup> Mann writes<sup>90</sup> that when substances capable of producing blood coagulation in the living organism—such as blood from another animal species—are injected in small quantities into a healthy animal, symptoms of hæmoglobinuria show themselves, and the animal dies after an interval of from a few hours to as many days. If large doses of sodium chlorate are injected subcutaneously or into the peritoneal cavity, the animal dies in from thirty to fifty minutes from the formation of thrombi in the heart, lungs, liver, and other organs, without any symptoms of hæmoglobinuria. When a moderate dose of the same salt is injected the animal lives for several hours or days, and hæmoglobinuria almost always occurs. In such cases capillary thrombosis of the thoracic and abdominal organs is also found on examination after death. In addition to the substances already named, toxic doses of arsenic and phosphorus were given,



with results similar to those obtained with sodium chlorate. There are reasons for believing that the infarcts thus produced are real thromboses, and not due to the formation of emboli. If an animal be killed in the early stage of the toxic action, minute coagula may be distinguished by appropriate staining agents, in the lungs and other organs, before any source from which emboli could be detached is formed in any part of the circulatory apparatus. Whether the clots are produced by the liberation of fibrin ferment or by the formation of other excitors of coagulation is left an open question. It is inferred that in the human subject a condition identical with that seen in animals occurs in poisoning by arsenic, sodium chlorate, and phosphorus, but that further research is needed to determine the relation of the changes thus produced to those which have hitherto been accepted as the cause of death.

*Benzene and Nitro-benzene.*—Some important studies of the toxic effects of benzene and nitro-benzene have been published by Neumann and Pabst.<sup>2</sup>  
Mar. 17

The milder cases, which are principally met with in persons employed in dyeing and cleansing, presented headache, vertigo, dizziness, and intoxication, which may reach the unconscious stage. These symptoms rapidly disappear if the patient goes into the open air. Benzene also causes slight trembling in the arms, accompanied by tingling and numbness. It is believed that these accidents are not entirely due to benzene, but to a kind of petroleum oil sold as benzene. In workmen employed in benzene distilleries symptoms of a more serious nature are sometimes observed, namely, intoxication, delirium; the patient talks incessantly; in some cases his speech is embarrassed. Aphasia is sometimes present; also epileptiform attacks, coma, aphonia, and mental disturbance. Loss of sexual power is often one of the earliest symptoms. Paresis, paralysis, facial hemiplegia, anæsthesia, hyperæsthesia, are also met with. M. Quinquaud has observed anæmia in workmen engaged in distilling benzene. The pulse is accelerated but regular, the skin hot, the eyes and face are animated. The patient emits a strong odor of benzene; the teeth and gums present a blackish edging, darker than that observed in lead poisoning, and threatening to spread all over the teeth. The action of benzene may be compared to that of chloroform and alcohol. Workmen who are addicted to taking large quantities

of alcohol are more rapidly and seriously affected than others by the influence of benzene.

Nitro-benzene, like aniline, may be introduced by the digestive passages, or by inhalation. The first effects are observed half an hour or an hour after it has been taken. The symptoms consist of general uneasiness, weakness, headache; the skin of the face and extremities assumes a livid, bluish hue; the nails are of a dead-blue color. Cyanosis invades the mucous membranes, the walls of the mouth, the gums, tongue, pharynx, etc. The patients exhale an odor of bitter almonds. Vomiting occurs in certain cases. The vomited matter and the sputa smell of bitter almonds. These first symptoms are followed by dyspnoea and quickened action of the heart, which gradually becomes slower. The pulse is accelerated and weak. Convulsions, cramp, contractions in certain muscles (trismus, opisthotonos, etc.), are observed. There is occasionally loss of consciousness, of sensibility, and of reflex power; the intellectual faculties are not usually affected. The urine has the odor of bitter almonds, and is thick, but free from albumen. In certain cases the affection runs a very acute course, and death speedily ensues. In others the morbid phenomena become gradually more marked, ending in coma or convulsions. These often last several hours and are followed by death. In some cases coma is followed by the gradual disappearance of all the phenomena. Of forty-four cases of poisoning by nitro-benzene, fourteen proved fatal.

Sury-Bienz<sup>126</sup><sub>on 16</sub> reports the first case of fatal poisoning from vapors of benzene. The subject was a robust workman of twenty-four years of age, working in a factory for chemical products. He had entered, contrary to rule, a close room filled with the vapors. Immediately he went out staggering, cried out, and fell dead. The autopsy presented two kinds of lesions—one series, having no direct connection with the accident, included a spot of cerebral softening, some old pleuritic adhesions, and a little thickening of the aortic and mitral valves. The lesions apparently due entirely to the benzene poisoning were: Intense general lividity; fluidity of the blood; universal venous congestion of the viscera; ecchymoses of the left pulmonary pleura; extravasations upon the mucous lining of the intestines, and pulmonary oedema.

*Carbon Monoxide.*—In a series of experiments Heineke<sup>326</sup><sub>24, 25, 26</sub>

investigated the action of carbon monoxide. He used coal-gas, the toxic action of which is due mainly to its carbon monoxide. The blood became bright red, and wide-spread blood extravasations, thrombosis, and submucous ecchymoses were found. In the organs of different animals thus poisoned were found a number of white thrombi, produced by changes in the white corpuscles, developing in them a tendency to adhere to each other.

*Cocaine.*—In observing the effects of toxic doses of cocaine on animals, Zancherski has noted some important pathological changes. The general results obtained by observation of the animals during life and by post-mortem examination of the bodies showed that in acute poisoning the mode of death was asphyxia. In chronic cases without asphyxia there was a marked hyperæmic condition of the central nervous system, which presented a contrast to the state of the rest of the organs, which were anæmic. Albuminoid degeneration was especially marked in the ganglionic cells of the spinal cord and the nerve-cells of the heart-ganglia; it was present also, but in a less marked degree, in the muscular fibres of the heart; in the ganglionic cells of the medulla oblongata, and in the hepatic cells. In these last there was found an accumulation of glycogen. In chronic poisoning the degenerative processes were found to have advanced farther in the cells of the spinal cord and medulla, minute cavities, atrophy, and hyaline degeneration being noted. In the heart there was fatty degeneration of the muscular tissue; in its nerve-ganglia there were fatty degeneration, minute cavities, and simple atrophy; and in the liver atrophy of the hepatic cells was present. The vascular system was most affected in the spinal cord, there being cellular proliferation and hyaline degeneration of the coats. In the heart and liver an atrophic condition of the tissues was found, also a swelling of the endothelium of the capillaries of the cardiac ganglia.

*Lead.*—In an elaborate series of experiments, chemical and physiological, Marshall<sup>80</sup> has determined that absorption of lead and chromium occurs when lead chromate is administered, but that, owing to its insoluble nature, absorption is slow. It appears probable that the absorption of the lead is gastric, and not intestinal, but the chromium of the decomposed salt is partly absorbed in the stomach as chromic chloride and in the intestines as sodium chromate.

*Nickel*.—Riche<sup>302</sup> states that the salts of nickel should range with the salts of iron. In experiments with dogs and guinea-pigs he has given doses varying from one hundred and twenty milligrammes to one gramme two hundred and seventy milligrammes (gr.  $\frac{1}{55}$  to gr.  $15\frac{3}{4}$ ) without causing serious disturbances. One dog absorbed twenty-one grammes (3 5 and 9 1) of the acetate of nickel in sixty days, and, far from succumbing, actually increased in weight. While we cannot form conclusions concerning man from these experiments, we may be justified in supposing that the use of nickel for culinary utensils is no more injurious for man than the use of iron would be, to which metal it bears much resemblance.

*Petroleum*.—An inquiry was conducted at the Point Breeze, Philadelphia, oil refineries, by Lewin,<sup>20</sup> into the poisonous effects of petroleum when swallowed accidentally. In the majority of seventeen cases either gastro-enteric or cerebral symptoms were caused. Vomiting was not induced, but frequently diarrhoea was present. In addition there were present hot sensation in the mouth and throat, gastric uneasiness, and griping pains. Occasionally urination became painful and sometimes jaundice appeared.

Among the brain symptoms were headache, vertigo, drowsiness, and deep sleep, like that produced by narcotics, with occasionally convulsions. A series of experiments showed that the heavy oils were poisonous to animals, but in no case was petroleum detected in the urine.

A severe form of intoxication has been observed in those who breathe freely the vapors at the wells. At first the men at the pumps may be exhilarated from the benzene, but among later phenomena have been noted coma and cyanosis, with contracted pupils, feeble pulse, and lower temperature.

Those who handle freely the heavy oils are subject to disseminated acne due to direct absorption of petroleum.

*Ptomaines*.—Under the name penta methyl endiamine, Ladenburg has formed synthetically *caulaverine*, a ptomaine, whose chemical composition has been determined. A research conducted by Behring,<sup>60</sup> shows that it produces in guinea-pigs symptoms resembling those of Asiatic cholera. If injected subcutaneously, in not too small doses, it reduces the temperature and the animal

eventually dies, in from a few hours to three days, by convulsions and difficult respiration. An example is given of a guinea-pig to which .35 gramme (gr.  $5\frac{1}{2}$ ) in two doses reduced the temperature from  $101^{\circ}$  F. to  $82^{\circ}$  F. in twelve hours. After death cadaveric rigidity is very strongly marked. The general post-mortem appearances in the case of guinea-pigs corresponded closely with those observed in the same animals which had died from genuine Asiatic cholera.

*Quinine*.—Fatal poisoning by quinine is so rare that every case is worthy of note. Kinner<sup>2</sup> records two deaths from it and a third case not fatal.

The salt was the sulphate, and was prepared by William Warner & Co., of Philadelphia. In the first case a child of three and a third years swallowed about twenty-five two-grain (0.13 gramme), sugar-coated pills, shortly afterward complained of headache, vomited, passed into a condition of stupor, and this was followed by death in about one and a half hours after the taking of the drug. In the second case a girl two years old took from eight to ten two-grain (0.13 gramme) pills, and was given an emetic, but died, in about two and a half hours, with rigors and a convulsion. In the third case a somewhat corpulent woman of sixty years, with intermittent fever, took upward of one hundred grains (6.48 grammes), and was found by Kinner with a pale, cool skin bedewed with sweat, and suffering from dyspnœa. The pulse was small and feeble. Coffee and whisky were given freely, and recovery took place, although severe earache followed the next day.

*Strophanthin and Ouabaïne*.—In April of this year Arnaud presented to the Academy of Sciences a note on the arrow-poison of the Comalis. This substance is Ouabaio wood, from which Arnaud has extracted a crystalline glucoside of a highly poisonous character. By subcutaneous or intravenous injections, two milligrammes (gr.  $\frac{3}{82}$ ) suffice to kill a dog weighing twelve kilogrammes (24 lbs.). Death occurs by cardiac arrest. At a later meeting, Gley<sup>3</sup> communicated the results of his experiments upon ouabaïne and upon strophanthin. He was led to the following conclusions: First, that ouabaïne and strophanthin, which have the same chemical composition, have the same physiological properties. Second, they are cardiac poisons, arresting the

heart in systole. Third, the fatal dose varies with the animal. Fourth, the most rapid method of administration is intra-venous; next, subcutaneous. By the mouth the action is much slower but equally toxic. Fifth, the toxicity of ouabaine is two or three times as great as that of strophanthin. Sixth, death occurs in from six minutes to one hour.

*Strychnine*.—In order to detect strychnine when used for toxicological purposes the following method has been proposed by Cripps<sup>156</sup>: The solid substance or mixture of substances is digested in six times its weight of methylated spirit containing a little tartaric acid. This is done for several hours at a temperature a little below the boiling point of the spirit. The liquid is then filtered, evaporated, and the residue dissolved in one ounce (31 grammes) of water and twenty minims (1.3 grammes) of spirit added. The solution containing suspended matter is then repeatedly shaken with a mixture of equal parts of chloroform and ether until all coloring matter is washed out. The chloroform washings are rejected, the aqueous fluid is rendered alkaline with ammonia, and again shaken with chloroform-ether to dissolve out the alkaloid, which again is re-extracted with acidulated water, the solution rendered alkaline with ammonia, and the strychnine finally dissolved out with chloroform-ether. The method can also be used quantitatively with very satisfactory results if the ethereal and other liquids be washed by a second or even a third treatment with the solvent employed. To test its accuracy 0.9 grain (0.06 gramme) of strychnine was introduced into a dead cat, and the stomach, etc., treated as described; 0.85 grain (0.055 gramme) of pale, yellowish, well-defined crystals was obtained.

*Uranium*.—Experiments recently made by Chittenden<sup>6</sup> attest the harmfulness of uranium salts to healthy tissues. Uranium is an irritant poison tending to destroy the life of the intestinal and renal tissues; enteritis or acute catarrhal inflammation was easily induced by the administration of small doses of the salts of uranium. In toxic doses it causes absolute anuria; in smaller doses, merely acute parenchymatous nephritis; in minute doses it has a diuretic effect. Oxalate of lime crystals in the urine and glycosuria were constantly noted in cases of poisoning by uranium.

## ELECTRO-THERAPEUTICS.

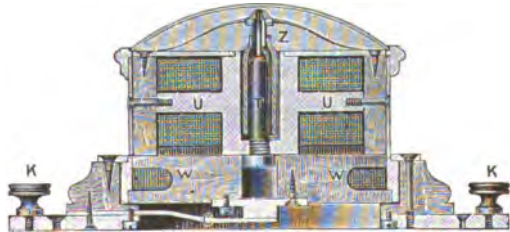
By A. L. RANNEY, M.D.,  
NEW YORK.

### NEW INSTRUMENTS.

A horizontal galvanometer combined with a milliampèremeter, devised by W. E. Fein, of Stuttgart,<sup>71</sup> is illustrated below. It combines the advantages of both forms of instruments, serving to record absolute units as well as amounts of electromotive force. The horizontal position of the dial increases to a considerable extent the efficiency and accuracy of movement of the needle, it being a recognized fact that these qualities are impaired to a greater or less extent by the vertical position.



*Statical Apparatus.*—H. A. Louis, of Chemnitz, Saxony,<sup>71</sup> describes a new electrotherapeutic head-breeze.



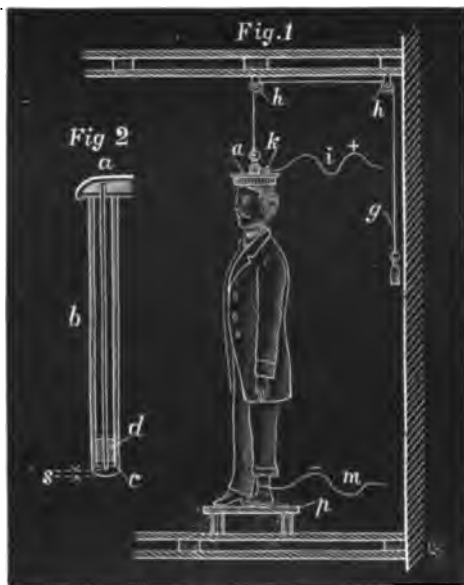
HORIZONTAL GALVANOMETER. (Ill. *Monat. Aerz. Polytechnik.*)

His ingeniously constructed apparatus consists in a head-plate of metal in the form of a disk. To his plate are attached a number of pencils, the ones in the middle being shorter than those at the periphery, thus forming a concavity corresponding to the convexity of the skull. Every pencil is insulated by a glass tube projecting one millimetre beyond its end and fastened by a piece of cork. In the centre of the disk a ring serves as an attachment for a cord,

(D-1)

which permits the raising or lowering of the apparatus to the proper level. The conducting wire for the anode is fastened to a hook screwed at the base of the ring, while the wire for the cathode is connected with the feet of the patient, who stands upon an insulated stool. This arrangement, of course, may be reversed.

The advantages claimed for this device are that the numerous pencils, by subdividing and accumulating strong currents, and producing a breeze, have a far more gradual effect than the common head-plate in use, making the apparatus applicable to the treatment of even the weakest cases with stronger currents than were formerly used. The effect produced is quite agreeable to the patient.



ELECTRO-THERAPEUTIC HEAD-BREEZE. (III.  
*Monat. Aerz. Polytechnik.*)

Eulenburg<sup>69</sup> closes his paper (first read in 1887, before the Congress of German Scientists at Wiesbaden) with the conclusion that in his experiments on neurotic cases his neurasthenic patients responded best to treatment by static electricity, and especially cases of so-called "head-pressure." This conclusion is the more remarkable in that Stein has found static electricity of but little avail in the treatment of neurasthenia. Both permanent

and paroxysmal forms of headache were benefited. Eulenburg is of opinion that motor disturbances respond better to other forms of electricity.

For electro-diagnostic purposes, in motor disturbances, static electricity is not found to be of much importance, since the author has thus far observed a decided parallelism in the action of the static and faradic currents in their action upon the paralyzed muscles or nerves. The author gives the history of six cases illustrating this fact.

In this article Eulenburg confirms all of his previous deduc-



tions and states that he has devised some modifications in his static machine. Instead of the Leyden jars he employs *franklinic plates*. These are attached to the top of the case instead of the anterior wall. From the horizontal conductors run metal rods insulated by being inclosed in glass tubes and projecting twelve centimetres through the roof of the case. These rods both end in metal globes, to which, at right angles and anteriorly, is fastened an attachment fourteen centimetres long and projecting four centimetres over the anterior wall of the case, and to which is connected a movable arm.

In a lecture and demonstration given at a meeting of the Imperial Royal Society of Physicians of Vienna by Professor Lewandowski,<sup>113</sup> after a *résumé* of the defects of all machines which have hitherto been utilized for the medical applications of franklinic electricity, he showed a new machine which he had found to be the best as yet devised, which had been invented by the mechanician, Hermann Glaser, of Vienna.

The two vertical iron supports are screwed to the four-legged wooden frame, their tops being joined together by a vulcanite rod. These uprights support the axles, which are parallel to each other. The axle is fixed and made of steel. Upon the chief axle there are two vulcanite collars, both of which are joined to a pulley band. In the middle of these two collars there are, on the chief axle, two hard-gum cylinders, one within the other. The internal cylinder and the external one can be rotated quite independently.

The whole arrangement allows the two cylinders to be turned in the reverse direction when the handle is rotated only in one direction. The wooden frame carries, besides, two uprights, the lower parts of which are made of glass and the upper of metal. They terminate in the two metallic knobs. In the middle of these supports are two metallic knobs, each carrying a collecting comb in close proximity to the external cylinder. The fixed steel axle carries a vertical metal rod inside the cylinder. The conductors can be moved to and fro in the horizontal direction. If the knobs of the conductors are brought near each other so as to come into contact when the handle is turned in any direction, it suffices to touch the external surface of the external cylinder with a strip of hard caoutchouc which has been rubbed with cloth (for instance, with the coat) for exciting or charging the machine. This

manifests itself with a whizzing sound. The strip of hard caoutchouc must be approached just in the middle of the two collecting combs.

When the rotation is again interrupted, the charge of the cylinders with electricity lasts for several hours as the result of a single rotation. The advantage claimed for this over all other machines of the kind consists in the very convenient and durable form of the electro-motors, that is, the cylindrical form; furthermore, in the choice of the material (hard gum), which is more durable than glass, as well as in the hermetical closure of the hard-gum cylinders. Owing to the latter quality, the machine could be kept in any place, in dry as well as in moist air, and used at any time, without being damaged, as neither dust nor air could change the internal surface of the external cylinder and the two surfaces of the internal cylinder. The machine is, moreover, very portable, and not dear (seventy-five florins, about thirty dollars). Other advantages are the long duration of the electricity when once produced, even after the rotation of the handle has ceased; the possibility of rotating the latter in an inverse direction without discharging the machine, and the easy change of the poles.

The rest of the apparatus necessary for franklinization as devised by Professor Lewandowski is also illustrated. It must first be remarked that when the machine is charged without the insertion of Leyden jars, and the discharging rods are removed from one another, a few sparks appear between the knobs of the conductors. If, however, the Leyden jars are inserted, quite powerful white sparks appear between the discharging rods. The rest of the apparatus consists of two stands for different electrodes; as, for instance, for the cap and for the electric head-douche, which is fixed to a stand and is movable in all directions. The apparatus also comprises the four-legged insulating stool, the legs being made of porcelain. The insulated cords unite the collecting combs of the machine with the insulated stool and the electrodes. Hand-electrodes, an ear-electrode, and a discharging rod for the discharge of the bottles are also described.

*Franklinism.*—As to the methods of franklinization, they comprise, according to Lewandowski, (*a*) the electrical charge; (*b*) the electrical wind; (*c*) the discharge of sparks. These three methods in the order here enumerated also represent the three

degrees of intensity of franklinization, the charge representing the mildest and the sparks the most intense method. The charge is thus given: The patient is placed on the insulated stool and unites the bottles to the positive or negative pole of the machine, whereas the second pole is conducted downward into the earth.

The electrical wind, which is also called the "electrical air-bath," and also, though wrongly, general franklinization, is produced in the following way: The patient is placed on the stool, which is, as before, united to one of the poles of the machine; the second pole, however, is not conducted into the earth, but is brought into contact with an electrode terminating in a point, which can be approximated to the corresponding part of the patient by means of the hand or by means of the stand.

In general, the two last-mentioned methods in Lewandowski's experience have the same effect as induction currents; the only advantage they present is that the patient might be electrified through his clothes, that he need not undress,—a point of considerable importance in female patients. On the other hand, the three methods had also peculiar effects which could neither be obtained by the galvanic current nor by the induction current.

Lewandowski states that he has obtained very favorable results with franklinization. The head-douche has proved to be an excellent remedy for sleeplessness, as well as a general sedative. He also could confirm the statement which had been made that "influence" electricity had a good effect in hystero-epilepsy; but as to epilepsy, in spite of numerous experiments, he had not yet been able to arrive at certain conclusions. In another direction he had, on one occasion, obtained a very remarkable success with franklinization which could not be obtained with any other method of the application of electricity. In a case of Basedow's disease in a woman, he had succeeded, by galvanization of the neck as well as of the spine, in diminishing, to a great extent, after a few sittings, the exophthalmic goitre as well as the other symptoms, particularly the headache, weakness, and sleeplessness. He had not, however, succeeded by galvanization or faradization in diminishing the frequency of the pulsations or in regulating the heart's action. He then tried the effect of an electric discharge toward the heart, and after a few sittings the frequency of the pulse became less and the action of the heart more regular. Discontinuance of the treatment was soon

followed by deterioration of the patient's condition in both respects. When the treatment was again applied and continued for a certain time, the patient completely recovered, and was dismissed as cured. In my opinion the device described by Lewandowski seems to be as yet too crude and too cheap to be effective in generating *large quantities* of static electricity. The reader is referred to my remarks upon this field in the *ANNUAL* of 1888, vol. v.

*New Induction Apparatus.*—Many inventors have been turning their abilities of late toward the construction of an electrical induction apparatus which shall allow of most accurate regulation, together with some means of exactly determining the number of interruptions occurring in a given interval of time.

W. E. Fein<sup>71</sup> describes such an apparatus devised by him, which he thinks fulfills the requirements of the case.

In the same publication,<sup>71</sup> however, an editorial comment appears upon this apparatus, stating that the need of such an instrument has been recognized for some years. Duchenne and others endeavored to fill this want by the use of pendulums and metronomes, which, however, proved insufficient. The first serviceable apparatus was shown before the French Academy in 1874, and can be seen depicted in the works of Onimus and Legros and of Barret. A far better arrangement was devised by Trouvé, and described in 1877 by Gavarret. The apparatus of Fein is only a copy thereof, and by no means an improvement upon it. The chief features are the same in both instruments, and, moreover, the French apparatus gives the number of oscillations with a far greater degree of accuracy and precision.

A description of Trouvé's instrument is given in the same number.

Rudolf Lewandowski<sup>118</sup> contributes a long article on induction currents. He reviews the different devices constructed by others for the purpose of giving galvanometrically measurable induction currents, these currents being of equal duration, recounts his own endeavors to the same end, and describes more fully the Helmholtz and Dubois-Raymond apparatus. The latter, the so-called slide-inductor, is at present the only source of induction force. He has for more than ten years tried to modify the Dubois-Raymond apparatus so as to obtain currents of equal intensity and duration, and has sought a method of easily deter-

mining their quantity. The latter he has not yet been able to achieve, but he has obtained the best results by the combination of two measuring apparatuses,—one a milliampèremeter reading from one-thousandth of a unit, the other a voltmeter, reading in one-thousandth of a millivolt; it being remembered that the current intensity of galvanic currents does not correspond to their physiological effects. He thinks it probable that in time the simultaneous reading of milliampères and millivolts will afford some method allowing us to measure with accuracy the induction current.

#### ELECTRICAL DOSAGE.

C. H. Merz, <sup>233</sup><sub>Mar.</sub> in an article on electrical dosage, reviews the number of milliampères used by the principal authorities. The figures stated are from two and a half to five milliampères for strictures of the male urethra, as used by Newman. From one to six are employed in destruction of superfluous hair from the face, one to eight are sufficient in the treatment of chronic inflammatory diseases of the spinal cord, while for the head a current of mild intensity is recommended, not exceeding three to six milliampères. Even with this strength it is dangerous to reverse the poles or break the current. For uterine fibroids a battery capable of generating two hundred milliampères steadily is required. To overcome pain Apostoli uses a large electrode covered with potters' clay, but this is an uncomfortable arrangement. Martin, of Boston, avoids this by the use of a hollow electrode covered with animal membrane and filled with a warm salt solution. In the treatment of exophthalmic goitre, one electrode, the positive, is placed over the cervical pneumogastric, and the negative to the solar plexus; a current of from thirty to seventy-five milliampères is used for ten to fifteen minutes daily.

In this connection I would say that the main points relative to electrical dosage were quite fully discussed in the *ANNUAL* of 1888, vol. v. It is not deemed necessary, therefore, to repeat the deductions of this article, important as they unquestionably are to the general practitioner.

#### THE ELECTRIC SHOWER-BATH.

Leduc, of Nantes, <sup>14</sup><sub>Sept.</sub>, applies general electrization as follows: One of the poles is immersed in a tub containing an alkaline

solution; the patient (placed beneath this reservoir) stands upon a metallic stool connected with the other pole. When the water in the reservoir falls in a shower over the patient, the current becomes established and the patient is electricized. The current is thus easily dispersed over the whole wet surface of the body, while the quantity and intensity of the current may be regulated at will.

#### ELECTROLYSIS IN VASCULAR TUMORS.

Boudet, of Paris, <sup>91</sup><sub>Mar. 12</sub> gives a brief *résumé* of the technique of medical electrolysis—chiefly in relation to vascular tumors.

According to him, the battery should consist of about twenty elements, of low resistance, in order to give a sufficiently intense current. He advocates a larger surface for the chamois-covered tin plates commonly used, finding that by doubling or tripling the usual amount of surface he lessens the resistance and correspondingly lessens the pain. In operations about the upper part of the face, the derivations of the current frequently produce vertigo and even syncope; this "dangerous region" is limited, according to this author, by a circular line passing at the level of the mastoid processes and the *alæ nasi*. The author remedies this state of things by surrounding the active pole by the same surface as represents the negative pole. He uses a chamois-covered plate having at its centre an opening large enough to admit the needles transfixing the tumor,—an arrangement which he thinks prevents derivation and the accidents due to it. The needles, which should be of gold or platinum, having pierced the tumor, are preferably connected with the positive pole, inasmuch as the fibrine only coagulates at the positive pole, at the vicinity of which the acids are concentrated. In this respect his views are not fully in accord with the majority of observers. The needles are covered with an isolating varnish—this protecting the neighboring tissues from the cauterizing action of the positive metal. All the needles are united on one conductor and act simultaneously. One to two needles are operated with a current not exceeding twenty to twenty-five milliamperes, while thirty-five or forty are needed when five or six needles are in use. Stronger currents are unnecessary or even dangerous, as they form soft clots, which have been known to become detached and produce embolism of neighboring or distant arteries.

Weak currents are used at first, their power being gradually increased during the application, and as gradually decreased to obviate the danger of syncope. The electrolysis is followed by no complications, the sittings may be renewed every week, and there is no danger of suppuration if the needles are dipped in a strongly carbolyzed solution prior to being put in use.

Boudet's conclusions are :—

The greater precision of electrolysis than of surgical means in the treatment of erectile tumors, the thoroughness with which the work is done, the lack of danger, the absence of suppuration, the certainty of non-recurrence, and the small amount of pain if the rules are carefully followed, should cause us to give it the preference over any other methods of treatment. Finally, there are many cases beyond the powers of surgery in which electrolysis can be used without danger and with invariable success.

The absence of scars and the thoroughness of the work done more than make up for the longer time employed.

Redard,<sup>345</sup> of Paris, reports having used electrolysis a large number of times in the last two years for the treatment of erectile tumors of the face. He also uses several needles joined together and only uses the positive pole, but never exceeds a force of ten to fifteen milliampères, as this enables him to reverse the current without any danger.

In an address on the value of electrolysis in angioma and goitre, by John Duncan,<sup>2</sup> in which he gives valuable data of successful treatment of nævi, of extensive cavernous angioma, of pulsatile angioma, and cirroid aneurism, with interesting cases of cure in two cases of orbital traumatic arterio-venous aneurism. Dr. Redard,<sup>345</sup> communicated some similar cases to the Congress in Washington, giving his technique, and ending by the following conclusions :—

1. Electrolysis is the method of selection in the treatment of erectile and cirroid tumors, and cures where others fail.
2. It prevents all accidents, such as eschars and suppuration.
3. It acts with certainty and precision. The puncture with the positive needle alone is to be used in the majority of cases.

Dr. Bories, of Montauban, showed photographs of a case in which he operated with brilliant results. The case was one of arterial angioma of the lower lip, of very rapid growth, with

ulcerations causing hæmorrhages which jeopardized the patient's life.

Daily sittings during four months, using two needles, caused a perfect solidification of the tumor and the cure of the angioma. The resulting deformities were remedied by plastic operations.

I greatly prefer the use of the positive pole for the relief of vascular tumors, or the use of both poles, in some cases, simultaneously. The needles should be inserted as near to the base of the tumor as possible, so as to shut off its vascular supply.

*Edison Current in Medicine.*—Carpenter, of Cleveland,<sup>222 Apr.</sup> describes a plan for applying electricity to the treatment of fibroid tumors without having a battery in the house. The incandescent electric lighting wire (Edison's patent) which passes in front of his house is diverted to his office. The Brush system and currents for arc lights cannot be used for this purpose with safety. The current so obtained is measured with a milliamperemeter, and its strength regulated by means of a switch-board. It is cheap, constant, and requires no generating apparatus.

*Electrical Condensers.*—Ladame<sup>197 Apr. 30</sup> reviews some experiments made by Dubois (privat-docent in the University of Berne) upon "The Physiological Action of Discharges from Electrical Condensers." This author gives a series of thirty-four experiments made upon man with the discharge of condensers, the most perfect of which enabled the observer to measure capacities of one microfarad divided in thousands. (The microfarad is the practical unit of electrical capacity.) Although these experiments have no important practical value in electrotherapy, nevertheless the scientific data he gives upon the action of these electrical discharges on healthy or degenerated muscle or nerve-tissues are of interest.

He finds that the physiological effect of the discharge depends upon an active electrical quantity which he calls *constante*.

This is found by subtracting, in each series of experiments, from the total amount of electricity furnished by the condenser, a certain quantity of which is *physiologically inactive*. This varies as the electrical tension (in volts) is more or less powerful. The *static quantity* is the product of the capacity by the tension. The inactive quantity is great in proportion to the weakness of the tension. Now, the nerve or muscle reacts only under the influence of the *active quantity*, which, according to the ingenious



calculations of Dubois, is at a minimum of 0.280 to 0.560 microcoulombs. The coulomb, the unit of measurement of electrical quantity, represents the quantity of electricity which passes, during one second, in a conductor with a resistance of an ohm with one volt of power. The microcoulomb is the millionth part of this unit. This shows how infinitesimal is the electrical force needed to produce muscular contractions. Below this quantity, however, we can obtain no reaction, even by augmenting the tension in volts. We then reach the limits of the physiologically inactive quantity which is to be disregarded in our calculations. The active quantity of electricity which produces muscular contraction therefore remains constant in the discharges of condensers. This constant quantity being the product of the tension in volts, multiplied by the duration of the current, the result shows that if the tension be great, the duration of the discharge will be very short, and *vice versa*.

Dubois' calculations in regard to this have given some very interesting results. Thus (basing his experiments upon himself) he finds that a discharge of seventy volts produced the minimal contraction when it had a duration of seventy millionths of a second, whereas a discharge with a tension of but 9.8 volts must last two hundred and sixty-one millionths of a second. These differences evidently are of no practical importance, since we possess no means of measuring a millionth part of a second. Yet it is because of their exceedingly short duration that the currents produced by condensers have physiological properties which may in time become of practical therapeutic use. The muscular contraction produced by condensers is so short, so instantaneous, besides being painless, having no irradiation, no electrolytic or chemical action, and no heat, that it may prove of use for purposes other than electrolytic or absorptive purposes. Dr. Boudet, of Paris, has proposed a condenser with the capacity of one microfarad, which is able to give the minimal muscular contraction with the same number of elements as the galvanic current. The action of the discharge is the same as that of the pile, without giving rise to the inconveniences of which we have spoken. The discharge of the condenser never gives rise to electrical tetanus.

The condenser may prove of more diagnostic than therapeutic value. The following observation leads us to think so:—

In a case of degeneration reaction, Dubois found that the quantity of electricity needed to cause the diseased muscle to contract was about a thousand times greater than normal. If the formula is reversed for the galvanic current ( $ASZ > KSZ$ ), it will be the same at the discharge of the condenser. Thus, when a healthy muscle reacts when the duration of the discharge is but a ten-thousandth of a second, the same discharge must have a duration of from a five-hundredth to a thousandth in order to contract the diseased muscle.

All these results are not definitive or exhaustive, but they suffice to show that the observer's researches are well worthy of being continued. They show that condensers will in time find a place in electro-therapeutics.

#### ELECTRICAL RESISTANCES.

R. Vigoroux, of the Salpêtrière,<sup>73</sup> contributes the results of some observations made by him upon electrical resistances considered as a clinical sign. His researches were first presented to the Société de Biologie, in the form of a note upon the electrical resistance of tissues, and principally related to the increase in resistance observed on the non-sensitive side in cases of hysterical hemi-anæsthesia. His measurements were made by substituting for the body of the patient a rheostat acted upon by the same number of cells and for the same length of time.

He goes on to show how much greater the difficulty is of making accurate measurements of resistance in the human body than in other conductors for many reasons. Among these he mentions the electrolytic property of all the tissues, the fact that the conductor is a living one, and more especially because of two well-defined laws, observed independently by Estorc<sup>84</sup> and Dubois.<sup>720</sup> These are as follow: (1) the resistance of the human body varies with the duration of the current; (2) it varies with the electromotive forces which produces this current.

He shows that although from many causes the variations are exceedingly great in degree in different subjects and in the same subjects at different times, we can make accurate enough calculations to establish without doubt the greater or lesser resistance of different subjects by the above-named method.

After mentioning the variations found in the resistance of

various nervous diseases, he goes on to state that the best conducting substances of our organism are the liquids.

If resistance is lessened in a given region, as compared with the same region on the other side, we may conclude that this region contains an increased quantity of liquids. These liquids may either consist in the blood contained in the vessels, or in a serous accumulation in the form of a collection or infiltration. In this last case the passage of the current brings about but a very slight modification, and a stationary state would soon be reached. In the first case, by far the most frequent, the rapidity with which the intensity of the current is increased appears to have a ratio to the vascular tonicity. Electrical resistance would thus be the reagent, and the very best, for the state of the vaso-motor system. The exploration of electrical resistance will give us diagnostic signs as valuable and far more delicate than the "Raie Méningitique," or the reaction to the shower-bath. It may prove a new means of finding out certain idiosyncrasies (such as the congestive ones), and some peculiar susceptibilities for toxic or medicinal agents.

*Human Resistances.*—Ch. Féré,<sup>3</sup> at a meeting of the Société de Biologie, stated that Vigouroux had shown that there exists individual differences of electrical resistance sufficiently marked to be of value as a clinical sign. In his experiments Vigouroux has found evidence that the state of the superficial circulation has far more to do with the amount of electrical resistance than the state of the epidermis, contrary to the generally accepted opinion.

Dr. Féré performed a series of experiments which caused him to side in this matter with Vigouroux. By creating sensorial or sthenic excitements in a patient subjected to a steady galvanic current, the needle of the galvanometer was instantly deflected a number of divisions, thus lessening the resistance, while the absence of any such excitations increased it.

#### ELECTROTHERAPY.

*Hydrocele.*—Dr. Spreafico, of Oran,<sup>73</sup> has obtained cures of idiopathic hydroceles by electrolysis. I have had some remarkably successful results by using the cathode in the sac and the anode on the thigh. From fifteen to twenty milliampères were used. Only one sitting may be required to effect a cure.

*Pseudo-Arthrosis.*—LeFort, of Paris, <sup>3</sup><sub>1893</sub> reports some most important experiments upon the use of electrolysis in pseudoarthroses. He gives five cases of ununited fractures thus treated with success, and recommends very short applications in order to avoid inflammation and suppuration. Dr. Labbé had also used electrolysis of the radius, and agreed with the speaker in his favorable conclusions.

*Stricture of the Rectum.*—At the March meeting of the Baltimore Academy of Medicine, S. T. Earle <sup>104</sup><sub>1893</sub> reported a case where an apparent cure of a very marked stricture of the rectum (which had existed several years, and, in spite of a linear procototomy, had contracted so as to admit only a small silver probe) followed eight sittings (one week apart), during which electrolysis by the cathode of a galvanic battery was performed (the anodal electrode being used upon the abdomen). These sittings were continued for fifteen minutes each. The stricture was still under treatment at the time of the report, but the opening admitted of the evacuation of partly solid stools, and a bougie could be passed that was two inches in circumference at its largest end.

In this report the number of milliampères of current employed was not, apparently, measured; but it is stated by Dr. Earle that "from ten to fifteen cells of the Barrett battery were employed." Such imperfect data are to be regretted and justly condemned.

I would suggest, in this connection, that many of the objections which have been raised respecting electrolysis in the urethra do not apply with equal force to the rectum, œsophagus, vagina, and other large mucous canals. The danger of electro-cauterization is not perhaps so serious a matter when the calibre is large as when it occurs in a long and small canal like the urethra. Again, the danger of using galvanic currents, when performing electrolysis, without an accurate milliampèremeter is not to be underestimated. *Less than one milliampère of current can cause electrolysis*; and, in this special region, it is not wise to use more than from five to eight milliampères under any circumstances. The number of cells used has no scientific value, and may be actually misleading in practical work.

*Cumulative Effects of Galvanism.*—A. D. Rockwell, <sup>1</sup><sub>1893</sub> at a meeting of the New York Academy of Medicine, called attention to the cumulative effects of a steady galvanic current. This could

be proved by the fact that a current from a given number of cells would after awhile show greater strength on the galvanometer. This is not due to improved conduction caused by an alteration in the circulation, as can be shown by a corresponding irritation caused by rubbing having no such effect. The cause is evidently an electrolytic or polarizing action of the current. The effect of a continuous passage was a sedative and tonic one. Attention was called to the injurious effects, in various forms of paralysis, of undue stimulation, with examples.

*Medical Electricity in General.*—W. E. Steavenson, of London, <sup>26</sup><sub>Feb. to Apr.</sub> contributes a valuable series of articles on the general uses of electricity in medicine, which it will repay the general practitioner to peruse. They discuss most of the essential points in electro-diagnosis and electro-therapeutics. These may be well known to specialists, but the general practitioner too often needs to have them repeatedly impressed upon him. The various topics discussed include electro-diagnosis; the use of galvanism, faradism, and franklinism; electrolysis, the electric bath, electro-magnets, electric light, the dangers of the indiscriminate use of electricity, and many of the special methods of treatment which have lately been employed for the cure of special diseases. The scope of this report precludes a complete *résumé* of these valuable articles.

I would also note the appearance of the second edition of the work of Onimus and Legros, revised by E. Onimus, <sup>1002</sup> which, in its first edition, met with much favorable comment. It is possible, with all pretentious works, to find points for unfavorable criticism; but, taken as a whole, this large work is worthy of much praise for the vast amount of valuable observation and clinical matter reported.

I note, with great surprise, that all insulation of needles for electrolysis is discarded by these authors; that the electrical treatment of *nævi* recommended is performed with the anode exclusively, and that many of the latest advances in gynæcological electro-therapeutics are practically omitted.

Following in the wake of Steavenson's published lectures, a lecture of H. Montague Murray, <sup>26</sup><sub>Apr.</sub> of London, upon electro-therapeutics appears, and the two afford an unusual opportunity for comparison of methods of presentation and the views respectively sustained by each. Dr. Murray shows a happy faculty of

classification, which greatly adds to the clearness of his presentation of facts and his interpretation of the underlying principles of electrical treatment. He discusses (1) the general principles of the action of different currents; (2) the various accessories to a complete outfit; (3) the various methods of application of electrical currents; (4) the treatment of pains, spasms, paralysis, and miscellaneous diseases; and (5) electrolysis in its relation to nævi, warts, moles, and superfluous hairs.

#### ELECTRO-THERAPEUTICS.

*Goitre.*—G. C. Pitzer<sup>192</sup><sub>May</sub> reports that uniform success has lately attended his efforts to relieve this disease since he has combined local galvanic applications to the tumor with the internal administration of one grain of iodoform, three times each day.

The galvanic applications (as employed by him) are made by the *labile* method, the positive pole being at the neck and the negative over the tumor. The negative pole is moved from time to time, simply to relieve the burning sensation. Unfortunately, he does not specify the milliampères employed, but states only that "from six to twelve cells were used." His view is that faradic and static currents are useless in the treatment of goitre.

*Stricture of the Urethra.*—The so-called "Newman method" of treatment of this condition by electrolysis has received a blow in the derogatory papers of E. L. Keyes<sup>1</sup><sub>Oct.</sub> and F. T. Brown<sup>245</sup><sub>July</sub> of New York. These papers seem destined to diminish, for awhile at least, the growing interest in this field, and certainly to stimulate those who are enthusiastic advocates of the method to a more positive demonstration of their claims. The deductions of Keyes are very much against the therapeutical value of this method, and his position seems, at first, to be fortified by the fact that he intrusted one of his cases to Newman (who obtained no better results than he himself did) and that he also took pains to acquire the full details of the procedure from Newman himself before beginning his investigation.

Although Newman cannot claim originality of discovery respecting electrolysis as a step for the relief of urethral stricture, his strong advocacy of this method and his reiterated assertion that it was practically infallible when skillfully employed, have led many to accept it (somewhat hastily, perhaps) as a great advance over dilatation or division. The pendulum now seems to be swinging

the other way, and the hopes of the profession, for a time at least, are somewhat dampened.

One thing seems to be certainly proved, viz.: that actual cauterization of urethral strictures by electricity (after the method of Mallez and Tripier, which causes a slough) is to be condemned in very positive terms. The point where the negative pole ceases to cause electrolysis and results in cauterization is not, in my experience, always possible to estimate. Neither can it be demonstrated that recontracture does not sometimes occur after the judicious and apparently effective use of the negative pole in the urethra, that pain and local irritation may not follow such a step, and that all urethral strictures of the organic type are capable of being radically cured by electricity.

Newman's claim, that this treatment causes neither pain, danger, nor inconvenience to the patient, and that the operation is never followed by hæmorrhage, urethral fever, etc., is certainly not sustained by the experience of some others, and seems to me entirely too broad to be worthy of entire credence. His statement that "electrolysis cannot fail, but operators may and do," places his method upon a ground that is liable to prove untenable. There is no reason in my mind why the details of this method cannot be easily mastered, and why competent men should not have had as good results as himself, if the method prove as infallible as claimed.

It is but just to Newman, however, to say that in a letter written in answer to the article of Keyes, he replies <sup>50</sup><sub>Nov. 29</sub> to many of the statements made in that paper and enumerates a long list of medical men here and abroad who have employed his method with success and have sustained it in their writings. The method must certainly soon be given a fair and impartial trial by many careful and competent observers, now that so much has been claimed for it. We may expect, therefore, during the ensuing year to gain a more satisfactory solution of the question of its efficacy, safety, and the permanency of its results.

Newman states in his last letter that the patient treated by himself was withdrawn from treatment by Keyes against his earnest protest when improvement had fairly progressed. The other six cases, treated by Keyes and his assistant (both being inexperienced in the method), can hardly, in Newman's opinion,

be pitted against the results obtained by W. F. Hutchinson, T. T. Frank, David Prince, Jacob Butler, J. H. Glass, T. H. Burchard, W. T. Bellfield, George E. Pitzer, C. A. Bryce, G. W. Overall, A. T. Douglass, D. O. Farrand, A. S. Wolff, J. B. Green, G. C. H. Meier, R. J. Nunn, T. F. Sanders, J. Craft, W. C. Wile, in the United States, with many others. In Great Britain the following may be pre-eminently noted among its advocates: W. E. Steavenson, W. Bruce Clark, Edwin Morton, T. J. Hayes, and S. Swinford Edwards. In Canada, C. R. Dickson, J. J. Cassidy, E. King, A. Laphorn Smith, etc., have had excellent results.

At a meeting of the Société de Médecine Pratique, in a discussion on chemical galvano-cauterization, some facts were brought out,<sup>24</sup> which I consider of the highest importance in view of the criticisms to which the method of galvanic cure of urethral stricture has lately been subjected. Garrigou-Désarènes read a letter from Tripier in which, among other things, he states that while it is true that *positive galvanism causes hard and retractile cicatrices, and the negative soft and non-retractile ones*, it is no less true that this eschar, when soft, may always be converted into a hard one by traumatism, *i.e.*, the frequent passing of bougies soon after the operation. I do not doubt that to this cause can be laid some of the failures that have been reported.

Of still greater importance is the fact reported by Gillet de Grandmont, to the effect that with two elements of a Chardin battery, giving a current of only 0.046 milliampère, and hence absolutely no cauterizing effect, he had been able to pass a stricture which was previously impenetrable to the same instrument, showing that to the cauterizing action alone could not be ascribed all the efficiency of the treatment.

I would urge upon my readers, in this connection, the *necessity of using a reliable milliampèremeter when electrolysis of the urethra is attempted*. From five to eight milliampères of current should never be exceeded.

It is impossible to do any scientific or practical work in the urethra by galvanism if the actual strength of the current is not definitely known and measured.

Any record of the *number of cells employed* is worthless, and grievous harm may unwittingly be done with a few freshly filled cells. The resistance is not the same in all individuals;



neither are the sensations of the patient a reliable guide. The time has passed when such a crude method can be pardoned or be leniently dealt with by scientific men.

I incline toward the view that some of the failures reported may have been due, in part at least, to bad judgment and a lack of proper regard to detail. Without prejudice, it would appear that very great error prevails respecting the electrolytic action of weak currents, and that the necessity of measuring them scientifically is too often disregarded. Sounds are also passed too often and too soon after the employment of galvanism.

*Chronic Constipation.*—The beneficial results of both faradism and galvanism in chronic constipation finds support in a late contribution by Leubuscher,<sup>319</sup><sub>p. 467, 77</sub> and the attested experience of G. B. Dozier, of Los Angeles,<sup>44</sup><sub>June</sub> in one hundred and fifty successful cases. The former author favors the latter method, using the cathode in the rectum and the anode over the colon, upon the abdominal wall. The daily sittings occupy from ten to fifteen minutes, and the current strength used was not enough to cause pain. Unfortunately, he does not specify the number of milliampères used. He continues the daily applications for from three to five weeks. Out of fifteen cases, four were cured, nine were relieved for a time, and two were not benefited. He claims that immediate results are not usually obtained. Gradually the fæces tend to become softer, and the passages follow the application at much shorter intervals as the treatment progresses.

Dozier sustains the efficacy of both galvanism and faradism, while my own experience leads me to favor the faradic current in the majority of cases, combined with the use of static sparks over the liver. One pole of the faradic machine is placed within the rectum, and the other electrode is moved over the course of the colon and held for a short time over the region of the gall-duct. Galvanic applications may, however, sometimes be employed in connection with this form of treatment on alternating days with great benefit to the patient.

It is always advisable to look carefully for some remote source of reflex nervous disturbance when a habit of constipation has existed for years without any apparent cause. The correction of such a cause will often materially aid in the recovery.

*Electricity in Gynæcology.*—At a meeting of the Obstetrical

Society of London an interesting discussion,<sup>22</sup> occurred upon the use of electrolysis in gynæcological practice, in which several eminent men took part. A careful perusal of the published transactions by any unprejudiced observer gives rise to the thought that on the part of the opponents of the method there was a lack of that liberality and kindliness to which earnest efforts and honest reports of experimental work are surely entitled. Lovell Drage and R. A. Gibbons, after the reading of Steavenson's technical paper on the subject, reported cases successfully treated by electrical applications. Drage had had cases of cervical erosion resisting treatment for several months which had been cured. William Duncan stated that he also had derived marked benefit from electrolytic treatment in several cases of myoma where the chief symptom was metrorrhagia. Playfair then said that he had obtained good results in several instances, and Inglis Parsons likewise reported cases in which this form of treatment had had good effects.

Bantock, on the other hand, said he had heard nothing so far of a convincing nature to his mind, and that there was no evidence in any of the cases reported of electrolytic action. The failure of the method, he thought, had started the practice of puncturing the tumor itself; and any good effects derived from this were due to the inherent tendency of such tumors to become absorbed or slough when interfered with. The caustic action might be of use in cases of granular endometritis. He was unable to find any profound knowledge of gynæcology in the cases reported by Apostoli;<sup>2</sup> these cases would have been relieved at once had a trocar been introduced, and they testified to ignorance rather than to ability. The method was only too apt to degenerate into quackery if it had not already done so, and the speaker complained that the matter had not been put forward by its supporters in a scientific spirit. He had no confidence in the method.

Routh then said he had tried the method before Apostoli had brought it out at the Samaritan Hospital, and had reduced the size of the tumor one-half, after a single application, but had produced severe eschars. He thought many cases would derive benefit from the treatment while others would not. In one case the negative pole had produced dilatation of the cervix. Electrical treatment, at least, would leave women intact—a point not to be lost sight of.

Champneys had tried the method, but would not say what his results were. In minor cases he saw no advantage in electrolysis over any other method. He thought that disastrous results were not often enough reported.

The President (Dr. Williams) had not tried Apostoli's method, though he had tried electricity in some cases. He had been disappointed in the literature of the method. Apostoli had quoted hardly any facts, merely describing the method. Dr. Williams alluded to the fact that in so large a number of Apostoli's cases it had not been found possible to introduce a sound. It was not possible to maintain such a statement as that the dilatation of the cervical canal effected by electricity was more permanent than by any other method. He asked why electricity had not been used to dissipate inflammatory products in places where its effects could be more easily gauged.

W. S. Playfair<sup>6</sup> answers most clearly and successfully many of the objections commonly brought forward by the opponents of the electrolytic treatment of uterine affections, and more especially those advanced at the meeting of the Obstetrical Society. The support of men like Keith and Spencer Wells (the former having declared that he should consider it to be almost a criminal offense to remove the ovaries or perform hysterectomy for a bleeding fibroid before the hæmostatic effects of electricity had been tried) shows it cannot be a senseless or useless procedure, as some of its opponents would have us believe. Moreover, at the meetings at Brighton and at the Obstetrical Society Dr. Playfair had been struck with the fact that all those who have fairly, patiently, and impartially tried the method believe that there is some power for good in it, and not one single opponent had put it to the test of clinical experience. Dogmatical and theoretical assertions of its non-value were worthless. Playfair did not pretend to have exhausted the matter in his own mind, but he had cases of undoubted value to bring up, though he had been told they were not so. The things which appear to him best settled are the facts of the hæmostatic action of the positive pole; which, even if it acts as a cautery, does its work far better than any other cautery known or than any remedy adapted for the purpose. The latter measures fail so often that removal by surgery of the uterus or uterine appendages becomes often necessary. In only one case out of eighteen of metror-

rhagia had the measure proved inefficacious, and in this the case and surroundings were very unfavorable. The others all gave good results, and yet many of them had already been submitted to other means of treatment, and without avail.

Four of his cases had given absolutely good results. The first was a case of several years' duration, attended with severe uterine pain and menorrhagia, for which all methods of treatment had previously been exhausted without relief. There was a fibroid in front of the cervix the size of a very large orange. The sound passed three and a half inches into a dilated cavity. The interval between the periods was between seven to ten days, and the periods lasted ten to twelve days, while twenty-five to forty diapers were used every day. Fourteen applications of the positive electrode were made, generally of two hundred milliampères. The periods steadily lessened in quantity and the intervals increased. The last interval, at the time of reporting, was twenty days, and the last period only lasted four days, being quite normal in quantity. She was enabled to resume her duties as a governess, which she had been compelled to abandon.

The second case had been under Playfair's observation for several years; her tumor reached above the umbilicus, and measured four inches and a half by the sound. The hæmorrhages were very frequent, and often amounted to severe flooding. The patient was blanched, very anæmic, and a confirmed invalid. After six applications she was compelled to leave for the tropics. After ten months had elapsed the lady wrote: "The periods have been gradually getting better, and do not last more than six days. I am now able to do anything that any one else does, except to play tennis and dance."

The third case had suffered for many years from hæmorrhages, which increased after her marriage a year ago. She often had to be plugged, and once her uterus was dilated and examined under an anæsthetic. No improvement followed. Playfair on seeing the patient found a mass of lobulated fibroid growing from the back and sides of the uterus, and which pushed the cervix forward behind the pubes. Before she could be admitted into King's College Hospital the flooding recommenced, and she was constantly fainting and unable to be moved. The resident accoucheur, Mr. Stephens, plugged her vagina and had her conveyed

to the hospital. She was blanched and alarmingly prostrated. On removing the plugs the hæmorrhage recommenced at once, but ceased on using a current of eighty milliampères. For some weeks several applications were made of two hundred milliampères, during which time there was no recurrence. Then she insisted on leaving, promising to return if the bleeding came on again. She has not been seen since.

The fourth case, fifty-four years of age, always profusely unwell, had grown much worse for a year or more. In March she had been continually losing blood, with only a day or two's interval since September. She had a mass of lobulated fibroid half-way to the umbilicus. Applications were begun in March, twelve applications of two hundred milliampères were made, and the hæmorrhage soon entirely ceased. On June 28th she wrote as follows: "I think it is time to write and let you know how I am getting on. I am very much stronger and better, and have had no return of the bleeding."

The foregoing cases appear to Playfair to be clinical facts of striking value, and short of hysterectomy or the removal of the uterine appendages he challenges any man to produce four such cases, treated for the same time, in which anything like as good results followed any other form of treatment.

At a meeting of the Glasgow Obstetrical and Gynæcological Society, Skene Keith<sup>219</sup> referred to the fact that Apostoli's method had suffered from abuse owing to inexperience with the force employed, and that it was the latter's merit to have placed the method on a scientific basis. He presented six cases:—

1. Very profuse menorrhagia, with tumor reaching three inches above pubes. Twenty-six applications. Recovery.

2. Very anæmic patient. Menorrhagia. Ergotine had had a fair trial. Tumor rose to umbilicus before menstruation. Recovery after seventeen applications, the tumor being reduced to a uterine measurement of three and a half inches. This case, albeit, was followed by a relapse.

3. Fibroid of fifteen years' duration. Abdomen and pelvis entirely filled with a tumor about twenty pounds weight. After the fifth application the tumor had shrunk one-third.

4. Patient so weak she could not walk without assistance, tumor one inch above umbilicus. It is doubtful whether hyster-

ectomy would have been successful in such a case. Immediate benefit followed the treatment, and after the fifth she walked nearly two miles, and her dress was already too loose. When last heard of she was very well.

5. Menorrhagia of some years' duration. Small uterine fibroid. Uterus three and a half inches. After seventh application with negative pole the menorrhagia was still very profuse. Several positive applications were then made, and the patient left well.

6. Extremely anæmic but with very little pain. Tumor filling abdomen and pelvis. Needles with negative pole applied September 11th and October 20th. Two days after the latter date there was no pulsation, and on the 29th she was better. After eighteen applications the tumor was reduced two inches in size and the patient was able to walk two miles.

He summarized the results as consisting of (a) diminished hæmorrhage, (b) diminished size of tumor, and (c) tonic general effects. He had noted that in no case was the excretion of urea diminished.

As to the risk attending the operation, he had made one thousand three hundred and fifty applications now, in his own and his father's clientele, and had only one accident. He impressed upon his audience the necessity of extreme care, as the least inflammatory condition was a contra-indication. In suitable cases it offered relief without the risks and terror of hysterectomy.

F. H. Martin, of Chicago,<sup>40</sup> gives a brief and valuable summary of the value of Apostoli's method:—

1. A means of generating a continuous current of electricity, of steady and uniform character, that can give an actual current strength through a resistance of two hundred ohms of five hundred milliampères is necessary in order to obtain all the benefits of this treatment.

2. Fibroid tumors of small size can be completely absorbed by the proper application of strong currents of galvanism.

3. Hæmorrhages from hæmorrhagic fibroid tumors can be promptly cured by the local coagulating effect of the positive pole when it is applied *in utero*. Severe neuralgias, so often accompanying these troubles, can invariably be relieved by three or four applications of this treatment.

4. When the cervical canal cannot be entered by any form of intrauterine electrode, flexible or otherwise, after repeated trials, a negative galvano-puncture should be made into the presenting part (if the obstructing mass of the tumor) and an artificial canal opened, which is to take the place of the impenetrable uterine canal in all subsequent treatments.

5. The intrauterine electrode should in all cases be negative, unless there is hæmorrhage or excessive leucorrhœa, when the positive pole is always required. The patient may, however, present symptoms demanding the use of both poles at successive operations.

6. The strength of the current should depend entirely upon the amount of active surface of the internal electrode, and should be twenty-five millampères for each square centimetre of active surface in actual contact with the endometrium. If more is used, the concentration of the current will be sufficient to cause troublesome cauterization; if less is used, the concentration at any one point will not be sufficient to cause the necessary coagulation for checking hæmorrhage.

7. The duration of the treatment should be seven minutes of the maximum current required.

8. The number of operations is necessarily dependent upon and influenced by the result to be accomplished. A severe hæmorrhage can be checked and symptomatic relief can often be accomplished by four or five séances, while a general reduction of the tumor necessitates many operations, varied, of course, according to the size and location. In some cases of large multiple tumors a relief of symptoms, or symptomatic cures, must be accepted as a substitute for an actual cure.

9. The operation should be intramenstrual, if possible; if hæmorrhage is continuous, however, operate during the flow. The séances can concur as often as every day with the system of concentration adopted that enables one to attack different portions of the canal at succeeding treatments, or treatment can be given with advantage as seldom as once a week.

10. Since the adoption of the flexible intrauterine electrodes and Apostoli's vaginal galvano-puncture, extrauterine puncture should be regarded, if at all, only as a last resort.

11. Galvano-puncture needles and the internal electrodes

should be constructed of material that has not been injured by coming in contact with strong carbolic acid, or one to a thousand bichloride mercury solution. All internal electrodes should be thoroughly scrubbed with a nail-brush and soap and water after each application, and allowed to remain in one or the other of these antiseptic solutions until they are employed again, when they should be washed in a weaker solution of the same before using. Before a vaginal puncture is made the vagina should be thoroughly wiped out with a one to three thousand bichloride solution.

12. There is no excuse for any percentage of mortality in the proper application of this treatment. While Apostoli has had two deaths in two hundred and seventy-five cases, he candidly admits that they were due to avoidable accidents rather than to any legitimate procedure of the operation.

13. In experienced hands, and by the adoption of the present means of concentration, the most delicate and sensitive patient can receive, without experiencing any severe discomfort, all the benefits to be derived from this valuable treatment.

In an interesting paper on "Electrolysis," E. C. Gehrung, <sup>27</sup> Aug. of St. Louis, calls attention to a mode of termination of the electrolytic process as applied to intrauterine neoplasms, which he thinks is not sufficiently recognized, *i.e.*, the cystic degeneration of fibroids caused by electrolytic puncture.

Retained particles after the operation may cause a cystic action to take place, at times changing the tumor into a cysto-fibroid. Abscesses, though more rarely, may also occur.

Owing to the occurrence of these cysts, he ably advocates a plea in favor of the use of a *tubular electrode* for puncturing intra-abdominal or intrapelvic tumors and cysts. Thus, he secures electrolytic action combined with the simultaneous escape of the products of chemical decomposition or of the contents of fluid tumors. He has devised an electrode consisting of a trocar and cannula, wherewith the tumor may be penetrated, electrolytic action caused, drainage, also, both immediate and remote, being easily had, as the cannula may be detached from the instrument and left *in situ*.

The author thinks that by means of some such instrument the statements made by Apostoli and Engelmann that electrolysis



does not work favorably in abscesses will be modified, in that, as this treatment will empty the abscess at the same time that the therapeutic effect is exerted on the abscess-walls, there need be no absorption of pus by the tissues. He goes farther, and states it as his opinion that if Semeleder had used such a method, securing evacuation of ovarian cysts simultaneously with electrolytic action, his success would have been far greater and the number of his followers very large.

The paper read by Apostoli,<sup>50</sup> at Glasgow, before the Congress of the British Medical Association, is chiefly controversial in nature, and in it are answered one by one all the objections brought forward by the opponents of his method. I am persuaded that Apostoli has succeeded in meeting his opponents with practical data and observations having far greater value than their theoretical deductions against his method. Prior to the above-mentioned meeting, in May, Sir T. Spencer Wells had read before the Brighton and Sussex Medico-Chirurgical Society a paper in which he threw the weight of his enormous experience and authority in favor of Apostoli. He gave the result of his personal investigation of Apostoli's method, having visited the latter in Paris, observed his methods, and examined a great number of his cases. Surely this support on the part of so eminent an observer is sufficient answer to such charges as that of Bantock, that the propounders of the method failed to meet the matter in a scientific manner.

J. T. Everett<sup>121</sup> contributes a valuable paper on electro-gynæcology. He has a record of 75 per cent. of cures in cervical stenosis, 73.5 per cent. in ovarian fibroids, while in vaginitis and vaginismus he has an interrupted series of cures. In beginning mastitis, before pus has formed, he is very successful with the galvanic current. If abscess has formed, the pus is to be evacuated by ordinary means, and electricity applied as before.

At a meeting of the Association of American Obstetricians and Gynæcologists, Laphorn Smith, of Montreal,<sup>50</sup> spoke highly of the Apostoli method in regard to its safety. He advises putting the patient to bed for a day after the application. He has had but two accidents in nearly a thousand applications, one being abortion, the other a resetting up of pelvic cellulitis, going on to abscess of the broad ligament, but ending in a cure. In fibroids, bleeding had

been arrested in every case, the pain had been removed, and symptoms of pressure on the bladder and rectum had ceased.

F. E. Bunts<sup>59</sup><sub>July 21</sub> has met with gratifying success in the treatment of cervical stenosis with a current of twenty milliamperes by means of graduated sounds fitted to screw into an insulated handle. He obtained one permanent cure of a case of membranous dysmenorrhœa of long standing by the use of forty to sixty milliamperes.

For an abdominal electrode he uses a flexible copper plate nine by ten inches, rounded at the corners, covered with gauze and clay kept moistened, and laid upon ten or twelve layers of lint moistened with warm water and spread over the abdomen.

F. H. Martin<sup>80</sup><sub>July</sub> reports his results in fifteen cases of intrauterine fibroids treated by galvanism. One proved unsuitable for treatment, four were benefited, five obtained relief from their symptoms, while five were absolutely cured. He does not puncture the tumors, but merely uses intrauterine and extra-abdominal electrodes.

At a meeting of the American Gynæcological Society<sup>50</sup><sub>Sept. 22</sub> G. J. Engelmann, of St. Louis, though not thinking that electricity should supplant surgery in gynæcology, said that indurations, inflammatory products, interstitial infiltrations, and neoplasms should be submitted to a trial of electricity before surgical procedures are attempted. He thought it greatly in favor of the method that men so strongly in favor of surgery as Keith and Martin should have so high an opinion of it. Wilson advised the careful selection of cases, and Graily Hewitt, though without much experience in the matter, thought that electricity would do much good.

W. H. Walling, of Philadelphia,<sup>186</sup><sub>Sept.</sub> thinks that in many cases electricity has done more in the treatment of cases of dysmenorrhœa of long standing than any other forms of treatment. He advocates general faradization as a tonic, together with the local galvanic applications.

In the third of his series of papers on the "Use of Electricity in the Diseases of Women" G. Betton Massey<sup>62</sup><sub>Aug. 15</sub> calls attention to the need of careful insulation of faradic electrodes intended for pelvic use, the vulva being exquisitely sensitive to the stimulus, while the uterine and ovarian surfaces are far less so, and the vagina stands midway between the two. He has found the faradic current most useful in neuralgic conditions, but beyond neuro-muscular stimula-

tion he considers a moderate faradic current powerless for good or evil.

In the fifth paper of this series, <sup>62</sup> while describing Apostoli's operation, he advises insulation of the uterine sound up to beyond the cervical canal, thus averting a possible cause of cervical atresia, an accident which has happened to Apostoli himself.

Apostoli, <sup>3</sup> referring to the use of high intensities in the treatment of uterine fibroids, says that currents of two hundred and fifty to two hundred milliamperes are not only not dangerous, but positively curative in many other cases in which lower intensities are not successful.

Apostoli, <sup>2</sup> discusses A. Tripier's views on the "Lower Faradic Current in Gynaecology," and calls attention to the preponderating part played by septic influences in gynaecology and to the fact that the uterine parenchyma becomes affected by continuity from the mucous surfaces. Powerful as the faradic current is to relieve early and purely mechanical congestions, as in simple subinvolution, it is, on the other hand, useless in chronic forms and in endometritis. The writer calls attention to his contributions to a more extended knowledge of the uses of faradism in gynaecology. Among these are vaginal bipolar excitation, the methodic and exact application of the current of tension, the treatment of perimetritis by electricity (for which he gives valuable rules), and his method of treatment of hysterical ovarian pain and of localized and general vaginismus. Some have advanced the idea that his success in treating these conditions depends greatly upon the patient's imagination, but he asserts that patients who are thus treated without a word as to the probable changes expected from the treatment, or as to its nature, derive as much benefit as the others.

*Extrauterine Gestation.*—James Aveling <sup>2</sup> read a paper upon "The Diagnosis and Electrical Treatment of Early Extrauterine Gestation" before the British Gynaecological Society.

After giving credit to the Americans for their work upon this subject, he mentioned some unsuccessful cases occurring in England, and stated that in these the methods used had been erroneous. Experience proved that a moderate faradic current was sufficient to kill the foetus in early gestation. The brilliant results of some operations that had been performed after rupture had occurred had

blinded many to the necessity of employing some means to prevent the latter happening. Objections had been raised on many grounds, but could readily be answered. The diagnosis of a case could usually be made out readily enough. As to treatment, laparotomy after rupture was a necessary and life-saving operation, but rupture itself ought to be prevented. No one would wait until an aneurismal sac had ruptured before using means to stay its progress. He believed that electricity acted by causing tetanic contractions of the foetal mass, resulting from the repeatedly broken current of an induction machine. The current should be as strong as the patient could bear, being gradually brought up to that intensity; it should last at least ten minutes, and be repeated every day until the operator is satisfied that life is extinct in the foetus. In one case he had used only half the strength of a Gaiffe machine, using the cathode through the vagina and the anode on the abdominal wall over the tumor. Four applications produced such marked change that the applications were discontinued, as the gestation had become arrested.

Mr. Lawson Tait had seen but one case of tubal pregnancy before rupture. In that case the only symptoms had been obscure pelvic pain of some months' standing. Three days later the symptoms had become most acute; she was bent double and could hardly walk. Upon opening the abdomen he found a ruptured tubal pregnancy. He denied that it was possible for any one to have made a diagnosis beforehand in such a case prior to rupture. As to the growth of the placenta, he had found macerated foetuses not more than ten or twelve weeks old, while the placenta was the size of a four months' pregnancy. D. Berry Hart and Knowsley Thornton had confirmed his observations. He could not accept the twenty cases alluded to by Aveling, which disappeared under treatment, as cases of tubal pregnancy, and disbelieve his own observations, which were supported also by others. He believed that in cases allowed to go on toward term all the children and most of the women could be saved by operative interference.

Inglis Parson said that there was no evidence that the placenta would go on growing after the foetus had been destroyed. No subsequent trouble had followed Garrigues' twelve cases.

Rutherford thought they could not be sure of extrauterine gestation before the third month, and that the faradic current was

dangerous, as the muscular coat of the tube was hypertrophied, and its contractions thus caused would be apt to bring on the very accident they sought to prevent.

Among other things, Imlach said that opinions had advanced much since the year 1872, when he had seen a case at full time allowed to perish for want of surgical interference. Laparotomy could always be performed, either at term or at the time of rupture; there was scarcely any danger in it, and he considered the method under discussion an absurd piece of meddling gynæcology.

Barnes had had no personal experience of the method, and would prefer simply to tap the sac.

Routh thought that in any case electrolysis was unnecessary. He would merely use an electrode within the uterus and the other over the sac. He should think it his duty to destroy the foetus either by electricity or puncture, but after three months would operate by abdominal section.

The President expressed an opinion adverse to the method, and Mr. Lawson Tait, after exhibiting some specimens of extra-uterine gestation, stated that if electrolysis was successful a useless organ was left with the risk of pyosalpinx.

*Tumors of the Breast.*—A. C. Garrett, of Boston, reports the cure of one hundred and fifty-seven cases of tumors of the breast (presumably non-malignant) out of one hundred and eighty-four cases by the aid of galvanism. He employed currents of from ten to fifty milliampères.

*Menstrual Disturbances.*—R. D. Blackwood<sup>178</sup> contributes some observations on medical electricity. He obtains his best results in dysmenorrhœa with high intensities of seventy-five to one hundred and fifty milliampères. In amenorrhœa he uses faradism daily, and uses both currents alternately in defective involution, while he uses high galvanic currents in the treatment of granular endometrium. He gives illustrations of the rheophores used by him in his treatment of these conditions.

*Salpingitis.*—Apostoli<sup>154</sup> read a paper on the electrical treatment of this condition before the Société de Médecine. His conclusions are of great practical interest, and are thus stated:—

1. The fever and inflammatory state are not an absolute contra-indication in gynæcology to the methodical and appropriate application of the electric current.

2. Non-suppurative inflammations of the uterus may be advantageously treated by the constant current, which, if it is favorable in congestive periods and inflammations of the first degree, appears to me, nevertheless, to be contra-indicated in cases of confirmed suppuration. I make an exception of the cases in which electric cauterization, in the tubular form, serves to create with the pus, near the vaginal wall, a more favorable and surer tissue.

3. The penetrating galvano-caustic, in the form of galvano-puncture, is a precise method that may serve a double purpose: (a) to absorb a phlegmasia at the beginning and to arrest an inflammatory process in its evolution; (b) to permit easy evacuation of a fluid collection through the channel made by the puncture, provided this collection is in the vaginal *cul-de-sac*.

4. Every inflammatory exudation occurring in the vaginal *cul-de-sac* may be justifiably treated by the penetrating galvano-caustic (under restrictions to be mentioned).

5. This method may be applied with success to certain cases of salpingitis and hydrosalpingitis, and with so much the more ease and harmlessness as the tumor is near the vaginal wall.

6. In every galvano-puncture the operator should rigidly observe the rules already laid down concerning the site of puncture, its depth, the size of the trocar, antiseptic precautions, the rest of the patient, etc.

7. Only two negative vaginal galvano-punctures, in a case of acute hydrosalpingitis, are sufficient to cause very rapidly a considerable anatomical regression and an absolutely symptomatic cure.

*Fibroid Tumors.*—A report<sup>218</sup><sub>v.1,p.22</sub> of a meeting of the Glasgow Obstetrical and Gynæcological Society gives the experience of several of the members with electrolysis in the treatment of fibroids of the uterus.

McIntyre summarized the clinical purposes of the electric current thus:—

To stimulate nervous system,	}	Twenty to thirty milli-
"    muscular    "		
To obtain electrolytic action,	}	ampères are requisite.
To obtain		
illumination,	}	Thirty ampères are requisite.

The positive electrode induced contraction and coagulation and the negative decomposition of tissues.

Stirton had had but six cases, had used the positive pole only. The tumor first became movable, then hard under the hand.

He was successful in all his cases but one, who was also subject to cancer of the rectum. The positive electrode was used, and blood issued from the rectum afterward.

Knox had had one unsuccessful case, a bleeding fibroid in a woman aged forty-five. There had been no obstruction and no difficulty in getting the sound to enter. Death, however, ensued, and at the autopsy evidence was found of pelvic cellulitis surrounding the cervix, with pus and metastatic abscesses.

Reid thought the active pole always acted as a cautery.

Keith did not find the negative pole any more dangerous than the positive one. He thought one hundred milliampères quite sufficient. The punctures should never go deeper than an inch. The deaths reported he regarded as accidental. He could not agree that the needle acted as a cautery, inasmuch as punctures healed at once even after a dozen times. If there was any caustic action this could not be; sloughs would be frequent, whereas they were rare.

At a meeting of the Glasgow Obstetrical and Gynæcological Society, Skene Keith, of Edinburgh, <sup>6</sup><sub>Dec. 21</sub> gave the details of six fibroid cases treated successfully as to reduction of size of tumor, mitigation of pain, and cessation of metrorrhagia, and the results obtained in fifty-eight cases (one thousand three hundred and fifty applications), whereof fifty-two had been greatly benefited.

*Stenosis of the Cervix.*—Henry D. Fry <sup>49</sup><sub>May</sub> states that in a contracted cervical canal the only valuable methods of treatment are by rapid dilatation and by electrolysis. The latter is the more valuable, in that no assistant nor anæsthetic is needed, it can be carried out in the consultant's room, and the patient resume her work shortly afterward. The immediate and remote effects of electrolysis are better and more lasting.

*Prostatic Hypertrophy.*—At a meeting of the Berlin Medical Society, Casper <sup>3</sup><sub>Apr. 20</sub> related his endeavor to relieve the conditions due to prostatic enlargement by electrolysis. He used a plate electrode over the vesical region, the other being introduced in the anus and guided with the finger to the point where the needle should be plunged. He begins with two elements, and keeps on adding two at a time until he has ten or twelve going. The

needle is slightly moved from time to time, and different regions are thus acted on. He used currents of from ten to twenty-five milliamperes. No pain is felt up to fifteen milliamperes. The upper part of the needle must be carefully isolated with an isolating varnish to prevent any destruction of the rectal surfaces. In four patients thus treated he obtained two successes, one was partly ameliorated, while another was unsuccessful.

*Superficial Fibroids and Angiomata.*—T. W. Nunn<sup>6</sup>, reports having employed electrolysis with eminently satisfactory results in fibrous and other tumors on the external surface of the body. In angioma he should hardly think of any other than the electrolytic treatment.

Dr. Bories, of Montauban,<sup>3</sup> reports the successful treatment by electrolysis of a voluminous erectile tumor of the lower lip.

I have had several cases where a radical cure of angioma of the face followed a coagulation of the blood within the sac by galvanism. This subject has been already discussed in preceding pages.

*Rheumatism.*—F. E. Stewart, of Wilmington, Del.,<sup>80</sup> states in an article on the treatment of acute and chronic rheumatism by means of the electro-vapor bath and massage that no benefit will be derived in the acute form from this treatment; but he claims to have had great success in those cases of chronic rheumatism which have been placed in his hands. His description of the electrical apparatus employed by him is extremely incomplete. It is stated that it can be used in connection with Russian (hot-vapor) or Turkish (hot-air) baths, and also with the douche and foot-bath. After the bath, massage and passive movement is thoroughly applied.

It seems to me that the criticism might be made that massage alone often cures chronic rheumatism, as do various forms of baths also, without an electrical agency. It is, therefore, hardly a reasonable deduction that electricity was of any material benefit in his cases.

In this connection, however, the observations of Lewandowski, of Vienna,<sup>850</sup> are of special interest. He reports forty-two cases of acute articular rheumatism which were *treated exclusively with faradism* by means of brush-electrodes. He claims that all rheumatic phenomena were at once arrested, that exudations were rapidly absorbed, and that the course of the disease was markedly abbreviated.



The brushes used were composed of metal, and, while one was held fixedly upon the affected point, the other was rapidly imposed on the skin over the articulation, so as to bring all its filaments in contact simultaneously, and then removed. The current was at first weak but was intensified (without distress to the patient) rapidly to a point which the normal skin could not endure without pain. He asserts that the greater the swelling and sensitiveness at the point, the stronger was the current borne by the patient. The application of the electrodes was such as to direct the current as nearly as possible through the middle of the affected point. He regards this application as a substitute for narcotics in acute rheumatic affections.

This author also sustains the view that galvanic applications are of great service if the anode be applied with care to each point affected and all painful localities, and general galvanization be subsequently practiced at each sitting. He advocates such applications (requiring an hour to make them) daily or even twice a day for some months if necessary in serious chronic cases.

The electrical bath, when properly constructed and furnished with cells having very large plates (so as to generate a large quantity with low electro-motive forces), gives, in my experience, equally good results in chronic articular rheumatism. Again, static electricity by the indirect-spark method often surpasses all other methods of electrical treatment of such cases.

It has been my practice for some years past to use the static spark application daily for some weeks in such cases; and, when improvement seemed slow, to give on alternate weeks electrical baths to such patients, with the aid of large Grenet cells. The ordinary electric bath is, unfortunately, imperfectly constructed, as a rule, for this or any other therapeutical purpose.

No field in medicine offers greater opportunities for advancement than the treatment of rheumatic affections, and if we are to find in electricity an agent which yields in other hands such results as Lewandowski describes untold benefits to suffering mankind must follow. Thus far medical science has yielded us but little in the way of local treatment for the relief of acute articular rheumatism. Lewandowski believes that all anodynes are inferior to the electrical treatment for the relief of the pains of acute rheumatism.

*Sciatic and Crural Neuralgia.*—The very remarkable curative effects of the “static spark” in these distressing conditions is receiving corroborative testimony from all sides. While I cannot agree with G. C. Pitzer,<sup>192 May</sup> in the somewhat sweeping statement that “static electricity will always cure, no matter how old the cases,” I have for several years past made this agent my chief reliance for the temporary relief of all severe paroxysms of this type of neuralgia. There can be no doubt that this agent generally effects some very startling results, even in chronic cases. I have seen several cases where one application has enabled the sufferer to walk, in spite of the fact that he had to be supported to the insulated platform. Many cases of this and other forms of neuralgia are apparently cured for many months, at least, by a few applications of heavy sparks. It is not well, however, to forget that most, if not all, the various types of neuralgia may be but a symptom of some underlying cause; and the frequent relationship of *various reflex causes* to recurring neuralgic paroxysms is now well established. Probably no reflex cause for such attacks is more common,<sup>1 Jan. 7, 11</sup> than defects in refraction or a mal-adjustment of the muscles which aid in obtaining binocular vision.

*Chorea.*—Probably no disease is supposed to have been relieved or cured (according to published statistics) by so many different and antagonistic methods of treatment as chorea. This is doubtless due to the fact that chorea consists of two types which are encountered clinically, one of which tends to get well under almost any circumstances, and another type which proves intractable to all medicine or electrical treatment. This clinical fact is mentioned here because I believe that too great stress should not be laid upon any electrical or medicinal line of treatment for this nervous condition unless it be clearly and satisfactorily demonstrated that the chorea had been of a persistent and chronic type, and that it had resisted all previous efforts that have been judiciously made to control it.

G. C. Pitzer<sup>192 May</sup> recommends strongly the use of a moistened sponge to the crown of the head (connected with the anode of a galvanic battery) and of the negative electrode over the “pit of the stomach.” He says, “Use from two to twelve cells, as the patient may be able to endure it.” He stops when dizziness or a metallic taste in the mouth is experienced by the patient. Dizzi-

ness is regarded by him as an indication of approaching syncope and of too strong a current. The daily sittings should last from ten to fifteen minutes, according to this observer.

C. L. Dana<sup>51</sup> advocates the same method, giving the current strength employed as from one to three milliampères. He also urges the use of a rheostat to control the current during the application.

Personally I have for some years been convinced that applications of the anode to the head have been of marked benefit to some choreic patients; but, on the other hand, I have seen many cases that were not in any way favorably influenced by it. It is certainly an expedient that may be safely tried.

*Epilepsy.*—The effect which thyroidectomy appears to have upon animals in inducing epileptic seizures has led Sighicelli<sup>244</sup> to employ galvanism to the thyroid as a step in the treatment of epilepsy. Out of seven cases one had been entirely relieved of attacks up to the time of writing (several months), and two had shown a marked diminution of attacks. The criticism which might be made to this observation, in my opinion, would be to caution the reader against the danger of coming to any hasty conclusion on such meagre data. The medical profession knows, as yet, but little about the various causes of epilepsy, and we have yet much to learn respecting its proper treatment. To-day many of the scientific minds of this country and Europe are beginning to search very carefully for various forms of reflex nervous disturbances in epilepsy (such as eye-strain, bad teeth, gastric, rectal, and ovarian irritation, etc.) before they imperil the health and mental condition of patients by the indiscriminate and unscientific therapeutical methods of the past that are fast becoming restricted or obsolete.

*Insanity.*—Joseph Wigglesworth,<sup>106</sup> in a recent article, discusses the effects of galvanism to the head in the treatment of insanity. His conclusions are that, while this step is not destined to revolutionize the treatment of insanity, the use of galvanism is followed by good results in selected cases, which might otherwise drift into hopeless chronicity. He believes that mental stupor, torpor, melancholia, and acute dementia are particularly benefited by galvanism.

He uses flexible plate electrodes, with the cathode at the forehead and the anode at the back of the neck.

Several cases intrusted to my care have been very markedly benefited by this form of application in from three to ten sittings. The current should vary according to the susceptibility of the patient from two to five milliamperes, and the duration of the sitting should not exceed five minutes. On no account should the current be broken during the sitting, as bad results might follow such an accident. One of my cases was considered by his friends as cured after five applications of galvanism. Prior to this treatment he was deemed incapable of self-management and was not allowed to go about without an attendant. On the other hand, I would not be construed as recommending this step as the chief or the only reliance outside of drugs in cases of disturbed mental equilibrium. It is my firm conviction,<sup>J.M.<sup>1</sup>, 14</sup> based upon an experience of no small magnitude, that "eye-strain" constitutes a most important underlying factor in causing abnormal mental conditions. This point in the causation and treatment of insanities has received but little attention by those familiar with and skilled in the later methods of testing for the errors most frequently encountered. I have seen several cases of insanity completely cured by treatment directed exclusively to the visual apparatus, and cannot refrain from impressing upon my readers the importance of the exclusion or detection of this factor in each and every case of insanity.

*Magneto-Therapy.*—The effects of the use of a strong magnet upon a patient observed in the clinic of Professor Benedikt are described<sup>J.M.<sup>2</sup>, 11</sup> as follows: "A girl, aged eighteen, had suffered for several months from very frequent convulsions, which, owing to their being complicated with laughing and weeping, showed that the case was one of hysteria. The expression of the patient's face was very timid, and her complexion continually changed, presenting at one time an excessive pallor and at others a glowing redness. The dorsal vertebræ, the left intercostal spaces, both ovaries, but particularly the left one, were very tender on pressure, and pressure on the ovary during internal examination brought on a fit of weeping. Professor Benedikt pointed out that such irritable forms of hysteria were particularly suitable for magneto-therapy, whereas most of the other methods, such as electricity, hydrotherapy, etc., might aggravate the disease, and the suppression of such attacks by means of narcotics frequently rendered the malady incurable. He applied the metallic magnet over the sensitive dorsal vertebræ without

having the patient undressed, as the magnet could act at a distance, and the dress presented no obstacle to its action. After some applications the patient became quasi-paralyzed; she could only with great difficulty and very slowly execute the movements which she was ordered to perform. It thus became evident how the magnet influenced the nervous system; it increased the resistance of conduction in the motor nerves, and this resistance could easily become absolute. During the general relaxation of the muscles the respiration became sighing and consciousness gradually disappeared. This became evident, not only from the complete want of reaction to external impressions, but also in part from the absence of recollection when the magnet was removed and the patient aroused from the hypnotic state by slight irritations. This was the usual form of hypnosis which was observed after the application of the magnet. The direct therapeutic effect in the case under consideration was that the sensibility of the vertebral column disappeared after the application of the magnet, while that of the intercostal nerves became diminished. The ovarian hyperæsthesia, however, in contrast with many other similar cases, did not show any decrease. On the following day the patient stated that her attacks had become less frequent and less severe. As the ovarian sensibility could not be removed by the application of the magnet to the vertebral column, the patient was directed to lie down on the abdomen, and the magnet, wrapped in a cloth, was first applied with one of its poles to the left ovary, and then to the right one. A few of these applications were sufficient to cure the patient. The chief indication for the application of the metallic magnet was a condition of increased irritability and active symptoms of irritation. With regard to the question, how, in a case like this—which was due to disappointed love—the treatment could remove the consequences of a psychical alteration, Benedikt gave the following explanation: The irritability of the nervous system becomes increased by the psychical irritation, and though the primary effect loses much of its intensity later on, a slight irritation is, nevertheless, sufficient to produce pathological phenomena. When, however, the irritability is diminished by an adequate course of treatment, the pathological condition is liable to disappear when the cause of the affection has lost somewhat of its primary intensity. This is, of course, true of all therapeutic

effects on neuropathic conditions, including the psychical ones, and for this reason we cannot expect to influence such patients before the primary irritation has diminished in intensity. Professor Benedikt went on to say that he had no doubt that we could also injure the patients with the magnet; he himself had, however, only once had the opportunity of observing permanent bad effects from this treatment. We had to take into consideration the peculiarities of each case. When the magnetic treatment did not produce a favorable effect at the very outset, he discontinued treatment, and in the same way he took care not to prolong the experiment when he saw that the patient's readiness to fall into the hypnotic state considerably increased. Professor Benedikt remarked, at the conclusion of his lecture, that since he had employed the treatment with the metallic magnet he found hardly any further indication for hypnotherapy. There was no doubt that the hypnotizations and suggestions augmented, in a rapid and progressive manner, the paradoxical behavior of the nervous system, and particularly the psychical function. More hysteria was thus produced than had been present before, and, strange to say, the mind ('psyche') of the experimenters was so easily brought into a condition of exalted confusion that they allowed themselves to be more influenced in the way suggested by the patients than the latter were by them."

*Electrical Stimulation of the Uterus.*—H. O. Hyatt, of Kinston, N. C., <sup>186</sup><sub>Feb.</sub> reports a case in which the labor pains had ceased, ergot failed to revive the uterine contractions, and the cervix was scarcely dilated, so that forceps could not be applied after three days had elapsed from the first pains. One pole of a faradic battery was applied to the sacrum, while the other was placed against the fundus, and the labor was completed one hour after the first application of the electricity.

R. W. St. Clair, <sup>186</sup><sub>March</sub> gives cases of successful treatment of atrophy of the testes; also one case of permanent relief of aphonia.

J. T. Everett, of Grinnell, Iowa, <sup>186</sup><sub>March</sub> has treated forty-seven uterine fibroids by electricity, with forty-three cures.

*Atrophy of Mammary Glands.*—According to Jordanis, <sup>86</sup><sub>May</sub> very satisfactory results may be obtained in atrophy of the mammary glands after confinement, where there is a deficient or absent secretion. He uses the faradic current.

*Œsophageal Obstruction.*—J. R. Sowers,<sup>188</sup><sub>Oct.</sub> of Warrenton, Va., used the faradic current in a case of impaction of a large piece of meat in the œsophagus. One electrode was placed on the stomach and the other as near as possible to the point of obstruction. After some strong and rather painful contractions the obstruction disappeared.

*Complete Procedentia Uteri.*—A. Laphorn Smith<sup>188</sup><sub>May</sub> reports an interesting case. The patient was seventy years old; her uterus was hanging outside of her body; the cervix was lacerated and covered with fissures and ulcerations. The organ was enlarged in every diameter, her thighs were excoriated by the discharge of the uterus, which stuck to her clothes. After six applications of the coarse faradic wire in the vagina she felt much stronger. Biweekly applications of the continuous current were then made, when the uterus gradually went up into proper position and the fissures healed. After four months she was discharged cured. Four months afterward she declared that she had had no further trouble since. The current used was one hundred milliampères.

*Enlarged Glands.*—Cases illustrating the use of electrolysis in the treatment of enlarged glands and tumors were reported by T. E. Potter<sup>65</sup><sub>Sept.</sub> before the Missouri State Medical Association. A tumor of the thyroid, cystic in character, of the size of an orange, was entirely cured by a couple of applications, the last one being under anæsthesia. Another case was under treatment at the time, consisting in a bilateral enlargement of the same type. External electrization had reduced it one-half, the tumor being the largest the doctor had ever seen. The diminution was continuing steadily. In connection with these cases he used tincture of iodine comp., six drops three times a day. In 1885 he had witnessed the removal by electrolysis of a malignant tumor the size of a partridge's egg from the neck of a gentleman. The tumor was a lupus.

*Electro-Hypodermic Injections.*—An interesting article has been contributed by Wachsner, of Berlin,<sup>69</sup><sub>Dec. 12, '97</sub> upon the "Effects of the Electrical Induction Current upon Subcutaneous Injections."

This author shows the disadvantages attending the hypodermic administration of certain substances, and more especially of quinine, arsenic, ergotine, ether, and camphor. The employment of these substances by subcutaneous injections is open to the serious objection that on account of their irritating properties they

are ill-borne by the patients, and apt to produce severe trouble at the site of injection. Imperfect imbibition of these medicinal agents causes inflammation, as evidenced by the familiar tumefactions so commonly seen at the punctured spot. This localized cellulitis may take a diffuse character of no little severity, and abscesses may also arise. It is evident that by causing, immediately after the injection, a series of strong muscular contractions and relaxations, an accelerated action of the blood-stream will ensue, and the foreign substances injected will be more rapidly absorbed, and also more thoroughly. These muscular contractions are most effectively produced by means of the electric induction current. Wachsner prefers the Leclanché apparatus for this purpose. He diminishes the resistance by means of a small electrode for the negative current, while a much larger electrode is used for the positive pole.

The skin is moistened with a warm salt solution, in which the electrodes are also allowed to remain for some minutes, thus increasing the penetrability of the skin. The most powerful muscles, such as the glutei or latissimus dorsi, are chosen for the injection. This having been practiced with a very sharp and thoroughly aseptic needle, the positive electrode is applied to the neighboring tissue, while the seat of injection is stroked with the negative electrode, considerable force being used. A weak current is used at first and gradually increased. All tenderness disappears in a few minutes, and, as a rule, no infiltration remains. Should this occur, a few repetitions of the procedure will cause it to disappear.

The author has so far experimented in forty-five cases, giving an aggregate of over a thousand times. Twenty-five cases were syphilitic, twelve were cases of hæmorrhage, and three were examples of various nervous disturbances. Eight to nine milligrammes of sublimate in a 1 per cent. solution were used in syphilitic cases at each injection. In hæmorrhage a solution of ergotine in equal parts of glycerine and water was employed (0.1 grain being injected). For camphor injections a solution in 96 per cent. of alcohol was used.

*Strangulated Hernia.*—Fred. M. Bauer<sup>1</sup> reports a case of strangulated hernia in a woman who had suffered from an irreducible inguinal hernia for twenty-six years. This condition was relieved by means of the faradic current. He mentions four other cases that have been successfully treated by the same means.



*Galvanic Storage.*—Louis Nyrop<sup>71</sup><sub>Nov. 1</sub> has devised a form of accumulator that has given general satisfaction during the last year and a half. It is constructed after Faure's method. He uses perforated plates, the openings serving to increase the surface coated with lead oxide. The plates are wrapped in two layers of thin linen and one of parchment, isolating the plates, which are made of various sizes, and placed in an ebonite vessel closed by an ebonite plate. Four openings in the vessel admit the wires and also serve to fill it with a solution of sulphuric acid (1-8). The accumulator is charged by a dynamo, and this charge will last about fourteen days. The charging takes about forty hours. One or all the elements can be used at one time.

*Galvanism of the Brain.*—Kny,<sup>54</sup><sub>Jan.</sub>, after a long series of experiments on the effects of the galvanic current passed from ear to ear, using a variation of Hitzig's method, confirms most of the latter's conclusions, arrived at 1871.

According to the strength of the current, four grades of vertigo are obtained: (1) numbness, (2) head movements, (3) eye movements, (4) apparent movement of objects.

The first is characterized by malaise, uncertainty, a sense of constriction about the head, and subjective sensations of light and metallic taste. The second, on closing the current, produces a constant falling of the patient's head to the side of the anode. On opening the current a movement occurs toward the cathode. Besides these lateral movements a forward deviation on closing, and *vice versa*, are observed. In the third variation, at closure, when the eyes are held quietly, and looking at a distance, a rotary motion of both eyes takes place, so that the upper margin of the vertical meridian pursues a uniform movement toward the anode, which is alternated by a short spasmodic movement toward the cathode. By voluntary motion of any one of the external eye-muscles a change in the character of this galvanic nystagmus is brought about. On looking at near objects a pure horizontal nystagmus takes place, in which a uniform movement takes place toward the anode and a spasmodic one toward the cathode. He is unable to confirm Hitzig's assertion that a weakly associated eye movement may take place on application of only one electrode to the head. In the fourth grade, in pure rotary nystagmus, the periphery moves in the same sense as a wheel having a vertical motion. On

looking at a near object the movement corresponds to the horizontal eye movements. On opening, the visual movement is on the opposite side. The head should be firmly fixed.

In using stronger currents, when distinct apparent motions of objects have taken place, the closed eyes give a sensation as if the head and body were turned toward the side of the cathode. Eye movements without apparent movements of objects occur at times, especially in subjects of previous experiments. Hitzig's statement concerning apparent movements without any eye movements could not be confirmed by the author. The cerebellum is undoubtedly the chief seat of action.

*Cataphoric Action of Galvanism.*—Boccolari and Manzieri,<sup>57</sup><sub>Sept. 2</sub> have instituted a series of experiments, at Galvagni's clinic, in Modena, upon the cataphoric action of the electric current. From these it appears that by cataphoresis it is possible not only to favor the introduction of many drugs through the tissues, but also to exert a curative effect on parasitic affections of the hair-roots. They are about to make further experiments in regard to the cataphoretic effects of the electric currents in connection with mineral baths, hoping to derive some advantage through an increased absorption of the mineral constituents of the waters in use.

*New Cautery Battery.*—Arnold Woakes,<sup>6</sup><sub>Sept. 15</sub> describes a cautery battery devised by him for use in the consulting room. The chief improvements connected with it are the use of a single large cell giving a maximum of quantity with a lessened intensity; the plan of letting the carbon plates remain always in the fluid, preventing crystallization of salts in their pores; and, finally, counterbalancing the elements so that the zinc plates may be immersed at any required depths, thus allowing a gradation in the strength of the current to be used.

*Electrical Treatment of Ulcers.*—Attention is editorially called<sup>117</sup><sub>Feb.</sub> to the use of galvanism in the treatment of indolent ulcers. A case is mentioned, occurring in a man of twenty, on whose leg an ulcer had remained unhealed for fifteen years. The negative pole was applied to the ulcer, while the positive pole was placed on some indifferent point, the séance lasting ten minutes. The case began to show improvement at once, and a half-dozen applications ended the case.

# CLIMATOLOGY AND BALNEOLOGY.

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## I. CLIMATOLOGY.

### GENERAL QUESTIONS IN MEDICAL CLIMATOLOGY.

THE influence of accidental oscillations of temperature on the production of certain diseased conditions has received renewed discussion during the year. Among the most important contributions to the subject is undoubtedly that of H. B. Baker<sup>402</sup> on the relations of certain meteorological conditions to diseases of the lungs and air-passages, as shown by statistical and other evidence. Diagrams and tables attached to the paper seem to show that in Michigan, at all events, where the observations were made, the rise and fall of sickness from pneumonia, bronchitis, influenza, tonsillitis, croup, diphtheria, and scarlet fever are more or less controlled by the fluctuations of atmospheric temperature, the diseases being increased by a lower and diminished by a higher temperature. *Per contra*, W. H. Ransom,<sup>6</sup><sub>Apr. 31</sub> denies the agency of cold in the production of disease. He bases his reasoning on the fact that many affections commonly ascribed to cold are not more prevalent in cold seasons than at other times, or in high latitudes than elsewhere, on an alleged tendency to underrate the numerical force of the instances in which exposure to cold fails to be followed by disease, and on the theoretical improbability that an agency acting on the external surface should be capable of lighting up inflammations of different internal organs.

The effects of atmospheric pressure are, according to E. S. Chisholm,<sup>31</sup><sub>Feb. 15</sub> too much ignored by medical climatologists. He believes more attention should be paid to barometric changes in our epidemiological studies.

H. C. Markham<sup>61</sup><sub>Feb. 15</sub> thinks that many of the victims of the Northwest blizzard of the early part of the year—not the Eastern blizzard of March—perished from asphyxia and not from freezing. “Many of the bodies, when found, were in the position of grasping

(E-1)

or clutching at their own necks or throats." The force of the wind, loaded with fine, dry ice-dust, produced a condition of the atmosphere entirely unfit for respiration and aeration of the blood. The synchronous extent of the storm exceeded that of any recorded by the Signal Service during its existence.

In an article on the meteorology of the Maritime Alps, Gueirard<sup>175</sup> advocates the extension of meteorological observations so as to include the determination of the quantity of luminous rays traversing the atmosphere, their intensity, and the quantity of polarized light, in addition to the constant observation of temperature, humidity, direction and force of the wind, and rainfall. These elements are necessary to give the characteristics of a climate. For Nice the writer claims high diathermancy of the air, blue, clear sky, and penetrating sunshine—all qualities highly desirable in a climatic health resort.

A very complete paper on the topography and climatology of Lyons has been published by Dr. Clément.<sup>211</sup> The hydrology, meteorology, and climatology are subjected to an extended analysis.

H. Rey<sup>158</sup> gives a summary of the medical climatology of the Cape Verde Isles. The annual mean temperature is between 23° and 24° C. (73° and 75° F.); maximum, 29.1° (84½° F.) in September; minimum, 14.7° (58° F.) in January. Range, 14.4° (57° F.). Daily range, about 5° (9° F.). Means for the seasons are: winter, 21° (69.8 F.); spring, 22° (71.6 F.); summer, 24.8° (76.2 F.); autumn, 24.2° (75° F.). The annual rainfall (1873) is 832.2 millimetres. Of this 24.7 millimetres fall in winter, 1.3 millimetres in spring, 326.7 millimetres in summer, and 479.5 millimetres in autumn.

The diseases prevalent are: in January and February, endemic intermittent fevers and pulmonary inflammations; March, diminution of pulmonary inflammations; April, decline of intermittents and recurrence of inflammations of the air-passages, which continue throughout the month of May; June, July, and August, gastro-intestinal inflammations; September and October, endemic fevers, sometimes complicated with gastric symptoms (bilious fevers); November and December, simple endemic fevers.

In 1873 there were three hundred and thirty-three deaths in a population of seventeen thousand, a mortality rate of 19.5 per thousand. The most frequent causes of death were, in order, pul-

monary diseases, cachectic conditions, congenital debility, digestive disorders, nervous diseases, and pyrexias. The largest proportion of deaths (nearly two-thirds) occurred in autumn and winter. The mean duration of life is between thirty-one and thirty-two years. The data upon which this calculation is based seem to me insufficient for trustworthy conclusions.

E. L. Bertherand<sup>1088</sup> points out that, while the deaths from consumption are declining among the Europeans in Algiers, the natives themselves are becoming more subject to it. The mortality from this disease constitutes fully one-fourth of all deaths. The dry, hot summer is more unfavorable to phthisical patients than the rainy season.

Irving A. Watson<sup>1088</sup> contributes a statistical paper on the extent and distribution of consumption in New Hampshire. He has studied the disease in that State from various points of view and comes to the following conclusions:—

1. That the disease prevails in all parts of the State, but is apparently influenced by topographical conditions, being greater at a low elevation with a maximum soil moisture than in the higher elevations with a less-moist soil. The prevalence of other diseases also affects the death-rate from consumption.

2. That the season has only a small influence upon the mortality from this disease. The popular idea that the fatality is greatest in the winter is shown to be erroneous, the greatest number of deaths occurring in May.

3. That the mortality is considerably greater in the female sex.

4. That no age is exempt from this disease, but that the least liability of its development exists between the ages of two and fifteen, and the greatest between twenty and thirty. Advanced age does not assure any immunity from the disease, as is generally supposed, but the smaller number of decedents is due to the fewer living persons of that advanced period of life.

5. The death-rate from pulmonary consumption is relatively much the larger among the foreign born.

6. The average death-rate from consumption for the years 1885, 1886, and 1887 is 12.86 per cent. of the total mortality of the State. In Massachusetts, for the ten years ending 1886, deaths from consumption averaged 16.10 per cent. of the total mortality; and in Rhode Island, for a period of twenty-five years ending 1884,

16.30 per cent. This shows a greater freedom from the disease in New Hampshire than in the two States mentioned.

#### CLIMATO-THERAPY.

Instead of an outing for one or two weeks, Waugh<sup>82</sup> July 16 proposes a holiday every seventh year, taking an entire year "off" for purposes of rest and recreation. The individual who is bankrupt of nerve-force by his constant and strenuous application to business could lay up a surplus of energy which would enable him to throw himself into his work with renewed vitality if a year instead of a month were devoted to recuperation. The suggestion is worth considering by those whose circumstances permit of its adoption.

A very interesting and instructive paper upon winter health resorts by W. S. Brown<sup>1040</sup> Nov. 27, <sup>99</sup> Jan. 15 will repay perusal on the part of any physician who may have patients to direct in search of comfort and health away from home.

Naturally, much relative attention is paid to the resorts, both European and American, with which the medical as well as the general public is most familiar. Of each of these places the unfavorable side is presented with as much fullness as the favorable: for instance, the winds and fogs of Biarritz, the rains and the cold changes of Pau, and the general fact that all Mediterranean ports are situated on bays into which the sewage empties without any active river currents or tides to carry it away. The author doubts if there is any likelihood of fixed disease of the lungs being cured in any of the resorts in the South of France. As to the Nile, apart from its expensiveness (the cost for each person of living on a dahabeeyah, which is the only comfortable means of living for a serious invalid, being about ten dollars a day), there is much dust, with frequent sand-storms, which are, of course, especially irritating to weak lungs. Algiers, or rather its suburb, Mustapha Supérieur, he regards as, on the whole, preferable to resorts on the north side of the Mediterranean. But there are no good hotels, except in the town, which is somewhat malarious, and the villas, which it is necessary to hire in order to live comfortably, are high-priced.

Of American winter resorts, Mr. Brown speaks of Colorado, Minnesota, Northern Michigan, the Adirondacks, and Lakewood, New Jersey, as examples of the "cold and dry" climate. Cali-

fornia has the disadvantage to Eastern invalids of requiring a long car-ride going and returning, and the winters are damp, the entire rain-fall of the year occurring between October and May. With many admitted natural advantages, Santa Barbara is windy and sometimes foggy. Los Angeles and San Diego he considers more desirable as permanent residences or as places of resort for the tired than as sanatory in cases of established consumption.

Asheville, N. C., and Aiken, S. C., he considers to be in the main favorable for consumptives from the middle of April to the middle of December, but for the other four months to be too cold and variable, and, in the case of Aiken, too windy for invalids to be able to lead an outdoor life. Asheville, like other resorts in the South, as well as elsewhere, needs an improvement in sanitary conditions proportionate to its growth.

For such patients as require a moist, warm climate, Mr. Brown considers Nassau the most desirable resort for English-speaking people, and he says that while he has known invalids dangerously ill with the early stages of consumption to recover in other localities, Nassau is the only place where he has known people to recover who have been pronounced by eminent and reliable diagnosticians to be in the advanced and "incurable" stages of the disease. Such recoveries have occurred in persons who went to the island; year after year, in November and remained until May.

Walter Lindley <sup>1891</sup><sub>Nov. 1</sub> describes the Conchilla Valley, in the eastern part of San Diego County, Cal., as a health resort. This valley is one hundred and thirty miles in length by thirty miles wide. It is about three hundred and sixty feet *below* sea-level. Patients with asthma, rheumatism, and consumption, who have visited this basin, claim to have experienced wonderful improvement. Dr. Lindley states that the dryness of the atmosphere in this valley and its increased pressure must be credited with the beneficial results. No observations are given by the writer.

Other places below sea-level, none of which are, however, known to me as health resorts, are, the Arroyo del Muerto, in California, two hundred and twenty-five feet below sea-level; the Caspian Sea, eighty-five feet below; Lake Assal, in Abyssinia, seven hundred and sixty feet below; the oasis Siwah, in the Libyan Desert, one hundred and twenty feet below; the oasis

Araj, two hundred and sixty-six feet below, and a number of other depressions in Algeria and the Desert of Sahara of various depths below the ocean.

Intimately connected with all questions of therapeutical climatology and balneology is the question of the sanitary conditions to which persons desiring to avail themselves of climatic or water-cures are subjected while undergoing treatment. It is notorious that many of the so-called health resorts are veritable breeding places of certain infectious diseases, of which typhoid fever is probably the most serious. Every year, at the end of summer, when people return to their city homes from the so-called health resorts in the mountains or at the sea-shore, they bring with them the germs of this pestilential disease. I have cognizance of at least a dozen cases of typhoid which developed at, or immediately after, leaving certain supposed health resorts last autumn. A personal examination, made last summer, of one of the most popular resorts on the Middle Atlantic coast demonstrated to my satisfaction that there are few difficulties that cannot be removed in the way of producing good sanitary surroundings. The State Board of Health of New Jersey has taken official cognizance of the question of the sanitation of summer resorts, and in consequence of their supervision the sanitary condition of the New Jersey coast resorts has been very much improved. It is to be desired that other States take similar action and compel the proprietors of summer resorts to place their establishments in such a hygienic condition that the occurrence of what has been aptly termed "summer-resort typhoids" shall be rendered impossible in future.

The climatology of old age was the principal topic of the Presidential address of Loomis<sup>1042</sup> at the last meeting of the American Climatological Association. High altitudes are not usually safe for the aged, and it is never safe for them to pass suddenly from a low to a high altitude when suffering from consumption. Marine climates are preferable under such circumstances. Persons recovering from acute pulmonary trouble may sometimes prevent phthisis by change of climate. Gout and rheumatism, so common in the aged, may be averted by sojourn in a warm, equable climate. Cystitis, which is often aggravated by a cold, damp climate, is benefited by changing to a warmer climate.



Persons advancing in years should pay more attention to climatic influences, as life may often be prolonged by wise measures.

The influence of climate in the causation and treatment of Bright's disease is being studied. J. C. Wilson<sup>1042</sup> calls attention to it, as did also Dr. Loomis. Little of definite value is known in regard to the influence of climatic factors in this disease, but there is reason to believe that low temperature, rapid changes of temperature, and high altitudes are unfavorable elements. On the other hand, equability and warmth are favorable influences.

R. G. Curtin<sup>1042</sup> thinks elevation has an influence on the development of Graves' disease where a hereditary tendency is present.

Regarding the injurious influence of altitude in cardiac diseases, George Chismore<sup>1</sup> gives notes of a case of advanced interstitial nephritis during a journey from San Francisco to New York. The observations seem to show that cardiac and renal disease is unfavorably influenced by rapid increase in altitude. The writer concludes: "In the light of my limited experience, I should strongly urge persons suffering from renal diseases of the diffuse type with heart complications to avoid all journeys involving great changes in elevation."

According to F. I. Knight,<sup>1042</sup> high altitudes, from four thousand to six thousand five hundred feet, are unsuitable for phthisical cases over fifty years of age, neurotic patients, or those with hectic symptoms or large cavities. Cardiac dilatation also contraindicates resort to high altitudes.

Deligny<sup>153</sup> thinks the assemblage of many cases of phthisis in the same place has a bad effect. He points out that certain mountainous regions formerly exempt from phthisis have become infected since greater facilities for intercourse with cities and phthisical localities have been furnished. The air of mountains, therefore, has no specific microbicide properties, and the crowding together of a large number of phthisical cases in the most healthy localities will soon have an unfavorable effect upon the purity of the atmosphere.

The sojourn at a mountain sanatorium is usually too short to secure the best results. Instead of remaining the summer season alone, a phthisical individual or one predisposed to the disease should remain several years in a favorable health station. Pre-

cautions must be taken, however, that patients are not exposed to pulmonary or pleuritic inflammations, and weak persons especially should be gradually accustomed to the diminished pressure of great altitudes.

For beginning cases of a torpid character an elevation of fifteen hundred metres (5000 feet) should be chosen. For erethic cases, or where the affection has made some progress, ten hundred to twelve hundred metres (3300 to 4000 feet) is a preferable altitude.

Dr. Deligny quotes at the close of his paper Dr. Williams' contra-indications to a mountain climate for phthisis.

In the treatment of phthisis, E. T. Bruen<sup>1042</sup> says that those climatic elements are most important which fortify the body against disease. No one climate is beneficial in all cases; some improve most on the sea-shore, others most in the mountains. Sunshine is always beneficial and overcrowding should be avoided. Sunshine, plenty of fresh air, and purity of the atmosphere are the important elements in climate for the treatment of phthisical cases. Porosity of soil is more important than dryness of the atmosphere, but the latter is usually consequent upon the former. Equability is not always of importance, as many cases do well where there are sudden atmospheric changes. Abundance of ozone and absence of dust are important, but rarity of the atmosphere is not always beneficial. Dujardin-Beaumetz<sup>67, 80</sup> points out the elements composing climate, the classifications made by various climatologists, indicating his preference for that of Weber, describes the physiological effects of various climates, and then considers the therapeutic indications and applications. He insists that the climate of a place is not the only therapeutic factor to be considered, but that habit, habitation, diet, and means of comfort generally must be taken into account when directing a patient in a climate cure. Speaking of climate solely he says:—

“Where you have to do with individuals predisposed to tuberculosis, or in the case of lymphatic patients, where the tuberculosis progresses with extreme slowness (we used to call these cases *tuberculosis of scrofulous form*), you may recommend the stations of altitude. The pure air which they will there breathe, the stimulating and revulsive action on the integuments of this bracing air, the enhanced activity of the respiratory functions—everything

tends to energize nutrition in these patients and constitute a medium refractory to the development or invasion of the bacillary element. The stations of the Engadine possess to-day hotels admirably equipped, furnished with covered walks, which enable the phthisical to stroll and take exercise even in bad weather, and enjoy in the midst of the snows and storms that prevail at these heights all winter long all the comforts of modern life

"On the other hand, when the tuberculosis has engendered disorders of some considerable extent in the lungs, it is necessary to avoid those climates of altitude and seek in preference the milder climates of the plains; and here we must establish a difference between phthisis with rapid or congestive form and tuberculosis of slow form.

"In the congestive forms you will recommend the moist and warm climates (Madeira, Pisa); in the slow forms, on the contrary, the warm and dry climates—the coasts of the Riviera, and of Hyères, San Remo, Pau, and Algiers, etc., are to be preferred.

"If phthisis is favorably influenced by change of climate, there are other pulmonary affections which may be completely cured thereby—chronic bronchitis, for instance, pulmonary catarrh, and asthma.

"The treatment of asthma is almost always a question of climate, but here all the conditions which we have enumerated are operative or not according to the patient whom you have to treat, and often it is in the most damp and unwholesome climates that the asthmatic will obtain cure from the attacks from which he suffers."

Dujardin-Beaumetz does not believe in the plan of long sea-voyages, now becoming popular in England in the treatment of tuberculosis, but of the treatment of scrofulous affections at the seaside he speaks in enthusiastic terms.

A writer<sup>2</sup><sub>Apr. 14</sub> points out the objectionable features of a sea-voyage to Australia in pulmonary diseases. Having made the voyage personally, the writer speaks with feeling of the unpleasant experiences.

A paper by A. Crosbee Dixey<sup>6</sup><sub>Aug. 11</sub> gives some advice about long sea-voyages for health. It contains tables of thermometric observations taken on a voyage around the world.

The proper differentiation of cases of tuberculosis and of climates

suitable for each class was stated in the ANNUAL for 1888 to be a desideratum to which medical climatologists should direct their attention. A notable contribution to the solution of this problem has been made in the course of the year by F. I. Knight, of Boston, <sup>99</sup><sub>Appl.</sub> in a valuable and well-arranged paper—"On the Selection of a Climate for Patients with Pulmonary Tuberculosis." He divides cases of phthisis into nine classes, and defines the cases and the indications of treatment as follows:—

1. Those presenting the earliest physical signs of chronic tuberculosis of the apex, who have as yet shown little, if any, general disturbance from the disease, and who complain only of morning cough and expectoration.

This class of cases especially shows the effect of improved ideas of treatment. The change from the old plan of enforced invalidism to an active out-door life has brought about many cases of arrest in this stage of the disease. It is, perhaps, not too much to say that the prognosis has been changed as regards this class of cases from very bad to very good.

While such patients do well in different climates, some of them without leaving home, the results have averaged far better in those who have sought mountain climate than in those who have pursued any other course. The region found best is the eastern slope of the Rocky Mountains, in Colorado and New Mexico, where the altitude ranges from four thousand to eight thousand feet.

The question will naturally be asked whether the patient should go at once from the sea-board to such a high elevation, or make a number of stops on his way out, in order to become accustomed to the diminished pressure. Dr. Knight has never known any ill effect in patients of this class from making the change at once; but it is necessary that they should consult a good local medical adviser at once, that they may be guided from the beginning particularly in regard to the kind and amount of physical exercise they should take.

2. Patients with more advanced disease, showing some consolidation but no excavation, nor any serious constitutional disturbance.

The mountain climate is suited to many of this class also, and it is fortunate if they are in condition to try it, but if considerable area of one lung or the apices of both are consolidated, and there

is well-marked constitutional disturbance, if the pulse and temperature are both constantly above one hundred, then it may be well to try some low altitude first. For very low elevations, the dry, rather stimulating, air of Aiken and its vicinity or the pine regions of Southern Georgia may be recommended for the greater part of the year, the patient going North in the summer. When quiescence in the morbid processes is established a move to the higher altitudes should be made.

3. Hæmorrhagic cases, that is, patients in whom a pulmonary hæmorrhage has been, perhaps, the earliest and a frequently recurring symptom, but in whom there is as yet no marked febrile reaction nor much physical evidence of disease.

This class seems particularly suited to the high altitude treatment. Contrary to the old idea, these patients appear to be less liable to hæmoptysis in high altitudes than on the plains. Of course, what is said in this connection does not refer to the hæmoptysis from rupture of a large vessel in a cavity of advanced disease.

4. Cases of advanced disease, those with cavities or severe hectic symptoms.

Patients of this class had better, as a rule, stay at home; certainly, if they are sick enough to be confined to the house. They can usually be made much more comfortable in their own homes than at any health resort, yet in patients with very constant and harassing cough the moist climate of Florida has given relief to the cough and has more than compensated for the want of some home comforts. A poor patient, or one without abundant means even, should not be given such advice.

5. Patients in an acute condition.

These may be quite different in their nature and requirements. We find (a) cases of acute general infiltration. These patients should be kept at home definitely. (b) Cases which begin violently, with high fever and marked consolidation of lung, resembling pneumonia. Patients of this class should be kept at home till after the subsidence of the acute symptoms, and then may be removed to some low, dry place; afterward increasing elevations may be carefully tried. (c) Cases of acute exacerbation during the progress of chronic disease. Patients of this class should remain at home during the acute stage, going, perhaps, to some mild, sedative climate during its decline; but as soon as possible after the

febrile disturbance is well over, if their condition otherwise warrants it, they should go to an elevated region.

6. Cases of so-called fibroid or interstitial pneumonia. Special indications in these cases have to be considered. If the patient is young and the heart is not enlarged he may be sent to high elevations. If he is over fifty years of age, or if his heart is dilated, or if his cough is very harassing, a lower altitude should be chosen. Southern California offers excellent places for such, with varying elevation and moisture to suit individual symptoms.

7. Patients recovering from acute pleurisy or pneumonia, in whom the eruption of tubercle is feared. High elevations are the places *par excellence* for these. The increased respiratory and consequent increased nutritive activity are exactly what is wanted to prevent the development of chronic disease.

8. Patients in whom the tubercular process has seriously invaded the larynx.

Such patients should be recommended mild and even moist climates, and on no account be sent to high altitudes. Southern California answers the purpose well. The dry air of high altitudes, however much good it may do by stimulating general nutrition, usually proves so great a local irritant to the larynx that incessant cough ensues, or, if the disease is situated high in the larynx, the swelling and ulceration of the cartilages are aggravated so that severe dysphagia and insufficient nourishment ensue.

9. Those with complications of other diseases.

In regard to these a good deal of care has to be exercised oftentimes. In case of cardiac affection it may be said that, while marked dilatation should prevent a patient's being sent into a high altitude, it is not necessary to exclude every one from such who has a cardiac murmur, or who even is known to have organic valvular disease with moderate hypertrophy, but such patients should be carefully watched and regulated in their habits, and should not be sent into the very highest altitudes.

In regard to renal disease, while it is admitted by the resident physicians that *acute* nephritis is severe in high altitudes, they do not admit that patients with chronic disease are made worse, but claim, rather, that they are benefited by a residence there.

Patients with intestinal ulceration are said to do badly in high altitudes, but they do badly everywhere.

In regard to the rheumatic diathesis, it may be said that acute rheumatism is thought to be rather prevalent and severe in high altitudes, and such a tendency might turn the balance in favor of a lower resort. On the other hand, the chronic form of rheumatism does not seem to be made worse by elevation.

In the discussion following the reading of Dr. Knight's paper the opinions expressed by Drs. Shattuck, Whittier, Vincent Bowditch, E. O. Otis, and Ayer generally agreed with those above noted. Dr. Shattuck spoke approvingly of the Adirondack climate and incidentally stated that pneumonia is an exceedingly fatal affection in the higher altitudes of Colorado. Drs. Stedman and Bowditch called attention to various interior towns of Massachusetts, especially Wellesley Hills and Sharon, and Bethlehem, N. H., where consumptives often underwent marked improvement when sent from the coast region. The great importance of making change of climate *permanent* and not allowing the improved or cured individual to return to the place of original infection was dwelt upon by several speakers.

Drew,<sup>99</sup><sub>July 14</sub> of Jacksonville, takes exception to the recommendation of Dr. Knight with reference to his Class 4. He protests against patients with advanced lung disease being sent to Florida. The only reason for the protest seems to be that such patients die, even in Florida, and so increase the death-rate from phthisis in that State. Dr. Drew does not claim that these cases are not benefited. R. J. Levis<sup>99</sup><sub>Aug. 11</sub> points out subsequently that the lives of sufferers with advanced phthisis are rendered more tolerable by a residence in Florida, and that they can exist at least in comparative comfort and finally depart from this life with little or no suffering.

Paul H. Kretschmar<sup>99</sup><sub>Oct. 30</sub> argues in favor of treating phthisis in sanatoria as against so-called "health resorts." In the latter the dissipations or other unfavorable practices cannot be controlled, while in properly conducted sanatoria the constant supervision and advice of a physician, appropriate diet and exercise, and required medical treatment are obtained. The results of sanatorium treatment are excellent. Brehmer, of Gœrbersdorf, who conducts one of the largest private institutions for the treatment of phthisis, states that during 1887 he had treated over seven hundred patients in his sanatorium. Thirteen per cent. of the entire number and

53 per cent. of those in the first stage of consumption were cured, a cure being pronounced when all the signs and symptoms of pulmonary consumption, including bacilli in the sputum, had disappeared.

#### HEALTH RESORTS—MARINE CLIMATES.

Orotava and other places in the Island of Teneriffe are becoming more generally known as health resorts for consumptives. The letters of Mr. Ernest Hart, <sup>2</sup><sub>Apr., May, '87</sub> Ohrwall's admirable paper (abstracted in the ANNUAL for 1888, p. 33), a paper by A. L. Gihon, contributed to the American Climatological Association (but not yet published), Bouquet de la Grye, <sup>153</sup><sub>Nov. 22</sub> and various publications by Victor Perez, to whom appears to belong the honor of first drawing attention to the magnificent climatic advantages of this island, have furnished considerable information upon the meteorology, topography, means of access, and provisions for comfort now available. An English company has recently built a large hotel in Port Orotava, which removes one of the most serious objections heretofore existing against recommending it to patients.

Dr. Perez (letter of G. V. Perez, collaborator) states that at Vilaflor, a mountain station, six thousand feet above sea-level, all the advantages of a mountain climate in its highest perfection are presented. With its dry atmosphere, its brilliant sky, pure water supply, pine forests, and its magnificent ocean view to the south, while protected against the northerly and northwesterly winds by the great peak, it easily rivals Davos and the popular resorts in the Engadine.

Mr. Ryan Tenison, <sup>2</sup><sub>Sept. 16</sub> gives personal testimony to the value of a winter residence at Orotava in tubercular disease.

R. B. Rentoul, <sup>28</sup><sub>June 1</sub> writes of Madeira and the Canary Islands. He gives much useful information to intending visitors.

Dr. John B. Brainerd, <sup>60</sup><sub>Apr. 19</sub> writing from Bermuda, thinks it a grave mistake to send consumptives to Bermuda. In advanced cases the symptoms are not ameliorated by the change. Cases of heart-disease and neurasthenia are improved or cured, and persons of advanced age live in comfort.

A correspondent, <sup>60</sup><sub>Nov. 10</sub> adds to the morbid conditions mentioned above which are beneficially modified by Bermuda climate the following: Genito-urinary troubles, chronic rheumatism and gout, bronchitis, chronic throat affections, fibroid phthisis, phthisis in its



early stages, malaria, convalescence of other diseases, and dyspepsia.

Schetelig<sup>41</sup><sub>Nov. 11, 72</sub> advocates the claims of Nervi, on the Eastern Riviera, as a resort on account of the higher humidity and smaller proportion of dust in the air. The higher humidity is due to the moisture of the prevailing winds. There are no cold northerly or northwesterly winds. Excessively dry winds are rare in the Levantine Riviera.

Consumptive patients generally do well, although they require the watchful care of a medical man familiar with the meteorological conditions of the locality. Patients should not be sent to health stations to do as they think best. Not only consumptives, but those suffering from bronchitis, catarrhal and other affections of the larynx, neurasthenia, rheumatism, nephritis, convalescents from typhoid, pneumonia, and surgical operations are benefited by a winter residence in the Eastern Riviera.

Chronic pleurisy usually improves markedly at Nervi.

Neurasthenia is not benefited in all its phases by a sea climate. The spinal and visceral forms, peripheral neuralgias, and insomnia improve, but cerebral neurasthenia is not improved by a moist and equable climate.

The attacks upon the climate of Nice by some writers has called forth a spirited defense on the part of Marius Odin,<sup>108</sup><sub>Nov. 1</sub> who points out the advantages of Nice and its vicinity as a health station. The sea-shore is indicated on account of its exciting and tonic properties in cases of atony, torpidity, and *lymphatisme*. On the contrary, in cases where there is exaggerated neurotic excitability, febrile pulmonary affections, etc., the patients should take up their residence at a distance from the sea-shore. A neglect of this precaution is doubtless responsible for unfortunate complications, such as insomnia, fever, oppression, hæmoptysis, etc.

A. J. H. Crespi<sup>32</sup><sub>Jan.</sub> has a paper on Bournemouth and its neighborhood. The total number of hours of sunshine in 1885 was fifteen hundred and twenty-four, in 1886 fifteen hundred and thirty-eight, an average of fifteen hundred and thirty-one for the two years. Assuming ten hours as the average daily sunshine period for the year, this would amount to about two sunshiny days out of five; not a very inviting condition to a tuberculous patient, for whom sunshine is a great desideratum if not an absolute neces-

sity. There were, likewise, in 1886 one hundred and eighty-six rainy days, although the rainfall was small. The relative humidity is high, being 81 per cent. in 1885 and 82 per cent. in 1886. Ilfracombe<sup>32</sup><sub>May</sub> has, likewise, a high humidity.

T. O. Summers<sup>12</sup><sub>Apr.</sub> writes about certain features of the Florida climate. In the first place, he notes its remarkable beneficial effect upon the healing of wounds. Larger doses of iodide of potassium can be given than anywhere else in the world except the Hot Springs in conjunction with the baths. Bladder troubles are rare, but kidney degenerations frequent. Aneurisms are also common.

Samuel L. Dutton,<sup>99</sup><sub>May 10</sub> from personal observation and experience, gives advice with regard to the care that should be taken by invalids before they are acclimated to the new conditions of life at the Southern California health resorts. In answer to the question, What classes of patients should be sent to Southern California? he says: Those who are so enfeebled as to suffer from the severities of a Northern winter; the overworked and those needing rest; the prematurely old; the rheumatic; the sufferer from incipient phthisis; the victim of bronchial troubles; the dyspeptic; and, in fact, all generally enfeebled people. Many among these are greatly benefited by a stay of a few months, and, excepting those suffering from a respiratory disease, may generally safely return on the approach of summer, *but not earlier*.

Dr. Dutton thinks there is little choice between the different stations from Los Angeles to San Diego. They are all much alike, except as to altitude. Santa Clara Valley, near the centre of the State, is also mentioned as deserving of the attention of physicians as a promising resort for patients.

R. B. Davy<sup>53</sup><sub>Oct. 27</sub> claims the following as the advantages offered by the climate of San Diego, Cal., to the consumptive:—

1. An equability of temperature unknown in any other part of the temperate zones at the level of the sea, except on small islands.
2. A pure, dry atmosphere, which is always bracing and never enervating.
3. A general freedom from malaria and all other diseases depending upon germs which enter the system by the respiratory tract.

4. A general freedom from insect pests, which renders outdoor life not only possible but pleasant.

5. Feasibility of spending every day of the year in the open air and the nights in a tent.

Jas. H. Parkinson<sup>2</sup><sub>May</sub> gives comparative tables of temperature at California stations and a number of the most popular Mediterranean health resorts to show the advantages of the former as resorts for invalids. Tables of the number of clear, cloudy, and rainy days and of the rainfall at some of the California resorts are also given.

#### INLAND STATIONS OF MODERATE ALTITUDE.

An editorial writer<sup>2</sup><sub>Aug. 25</sub> advocates Northern Africa as a section of country admirably fitted "for that large class of cases of incipient phthisis in which 'camping out' offers one of the best modes of climatic treatment. During the winter months there are many parts of Algeria and Tunis which could be leisurely traversed by caravan by those in search of health." The suggestion deserves the consideration of European invalids.

The climate of Pretoria, a city four thousand six hundred and twenty feet above sea-level in the gold-field district in South Africa, is lauded<sup>6</sup><sub>May 28</sub> for its salubrity and benign influence in ill health by Dr. J. W. Stroud.

The climate of South Africa was the subject of discussion<sup>6</sup><sub>Nov. 17</sub> in the London Medical Society. Natal, Graham's Town, Cape Colony, and the Karoo district were commended as places of resort for patients affected with phthisical and catarrhal troubles of the air-passages. Elevations up to six thousand feet above the sea-level could be found as one leaves the coast.

Dr. Coltman, corresp. ed., writes from Chinanfoo, China, that his observations lead him to regard the inland counties of that province as a splendid climate for consumptives, except during the months of July and August, which constitute the rainy season.

Australasian health resorts are described by L. Bruck.<sup>1043</sup> C. R. Drysdale<sup>22</sup><sub>Sept. 15</sub> speaks highly of the Australasian resorts in early phthisis. One advantage they have over Alpine resorts is the fact that poor persons may find means of livelihood in the former places, where food is cheap and open-air labor well paid.

Gersau is a small Swiss health resort on the borders of Lake Lucerne, which is highly lauded by W. Kellner<sup>84</sup><sub>Apr. 22</sub> in apical catarrhs, pneumonias, pleurisies, scrofula, and anæmia in young persons. The scenery is beautiful, the accommodations good and reasonable in price.

H. R. Bigelow<sup>61</sup><sub>Sept. 16</sub> gives an excellent itinerary from Carlsbad to Salzburg and through the Salzkammergut. It can be profitably consulted by any one who expects to send invalids on a European tour during the coming summer.

Orlando, Florida, has notable claims<sup>80</sup><sub>Sept. 16</sub> as a health resort, according to R. H. Peak. It is about the centre of the State, one hundred and sixteen feet above sea-level, surrounded by pine forests and orange groves; the mean winter humidity is 78.4 per cent.; mean annual temperature, 72.6° F. (22.6° C.); maximum temperature, 98° (36.6° C.).

The climate is beneficial in phthisis in all stages, catarrhal troubles of the lungs, asthma, and rheumatism. It is also an excellent place of resort for those of advanced years to await the end in comfort.

Accommodations are excellent in both hotels and boarding-houses. The city having some six thousand inhabitants, invalids can command more comforts and conveniences than in smaller places.

Flat Rock and Hendersonville, situated in North Carolina between Asheville and the South Carolina line, are recommended by Allard Meminger as climatic resorts, especially in catarrhal phthisis. The plateau on which the two places are situated is two thousand two hundred and twenty-six feet above sea-level.

James P. Booth,<sup>77</sup><sub>Aug.</sub> on the basis of favorable experience in several cases, lauds the climate of the Mojave Desert for wounds. Wounds and injuries heal rapidly and with little or no pus formation.

Tehama County, situated in Northern California between the Coast Range and the Sierra Nevada Mountains, is recommended by John Fife<sup>44</sup><sub>Aug.</sub> as a resort for consumptives. The climate is dry, warm, and equable. From May to October the daily range of temperature rarely exceeds 15° (8° C.). Invalids can live out-of-doors all the time, day and night, during the months mentioned. There is neither rain nor dew during the summer.

## MOUNTAIN CLIMATES.

Dr. Veraguth, <sup>211</sup><sub>May 13</sub> in speaking of mountain climates, mentions the following as special indications for their therapeutic use in summer: malaria, neurasthenia, anæmia, fatty deposit on the heart, atonic dyspepsia. In winter, on the contrary, tuberculosis is the disease for which a residence in a mountain climate is especially indicated. Tuberculous patients with laryngeal affections, however, do badly in mountain climates in winter.

In a healthy person the pulse and respirations are at first increased on ascending to a high elevation (four thousand feet and upward), but after a short interval both return to the normal. The amount of  $C_2O$  and  $H_2O$  in the expired air is increased, but the quantities of urea and uric acid are unaltered. There are also general cutaneous hyperæmia and diminution of weight.

## MOUNTAIN STATIONS.

C. Theodore Williams <sup>2</sup><sub>pp. 1008, 1009</sub> has analyzed one hundred and forty-one cases of consumption treated by residence at high altitudes. The following are the practical conclusions reached: Prolonged residence at high altitudes is beneficial in the majority and curative in many cases of phthisis. Pyrexia and all acute symptoms interfere with the beneficial effects of a rarefied atmosphere. Residence at high altitudes causes enlargement of the thorax, hypertrophy of healthy lung-tissue, and development of emphysema around the tubercular lesions, coincidently with diminution of pulse and respiration rate. These changes are accompanied by improvement in the general condition. Both sexes profit equally by mountain residence. The high altitude treatment seems especially adapted to cases where hereditary predisposition is present. Hæmoptysis is no contra-indication to the mountain treatment. Recent cases are most benefited. A six months' residence is necessary to secure the full benefit of the treatment. In more advanced cases one or two years may be requisite to produce arrest of the disease.

In addition to consumption, mountain climate is beneficial in cases of imperfect thoracic and pulmonary developments; in chronic pneumonia without bronchiectasis; chronic pleurisy where the lung does not expand after the removal of the fluid; spasmodic asthma without much emphysema; in anæmia.

The following conditions contra-indicate residence at high altitudes : phthisis with double cavities, with or without pyrexia ; cases of phthisis where the pulmonary area at low levels hardly suffices for respiratory purposes ; catarrhal phthisis ; erethic phthisis, or phthisis with great irritability of the nervous system ; emphysema ; chronic bronchitis and bronchiectasis ; diseases of the heart and greater vessels ; affections of the brain and spinal cord, and conditions of hypersensibility of the nervous system, and where the patients are of advanced age and too feeble to take exercise.

Dr. Williams, <sup>2</sup><sub>May 19</sub> writing later to correct certain errors in the published discussion on his paper, refers to the unfriendly attitude of the Swiss authorities at Davos and the resorts in the Upper Engadine in refusing to English practitioners the right to practice. He says : " The result will be that English physicians will not unnaturally hesitate to send patients where they are deprived of the services of their own countrymen, and will be induced to look to other high-altitude stations, such as those of Colorado and New Mexico, which have been proved to be equally efficacious, where comfortable hotels abound, and where English medical men receive a warm welcome from our sensible and large-hearted transatlantic cousins."

" The Davos and Engadine Valleys " is the title of a very complete paper <sup>32</sup><sub>July</sub> by Arthur Foxwell. He describes the various resorts in the two valleys, their climatology and accommodations, and indicates the class of cases that should be sent to mountain resorts and at what time of year they should be sent. The humidity, both absolute and relative, is low, the solar radiation high, the barometric pressure five inches less than at sea-level ; there is heavy snowfall, much sunshine, and little wind.

The effect upon the circulation is to decrease the cardiac rates.

The chest is expanded by a prolonged residence at Davos. Williams supposes this to be due to hypertrophy of the healthy portions of the lung and emphysema of other portions, especially those bordering on solidified areas or cavities.

Anæmic patients do well, but those liable to acute inflammations are bad subjects. In chronic bronchitis and laryngeal catarrh the climate of the high Alps should be useful. Chronic bronchitis with secondary changes and advanced bronchiectasis are not benefited by the mountain air. Eretic cases do badly.

The best time to go is in midsummer, and the stay should last until the patient has recovered.

The same resorts are the subjects of a shrewd, gossipy article <sup>1</sup><sub>Sept. 29; Oct.</sub> <sup>79</sup> by D. B. St. John Roosa. Attention is called to the fatigues of an ocean voyage, the discomforts of European railway travel, the overcrowding of some of the resorts in the Engadine, notably Pontresina, and the insufficiency of the regular meals at many of the European hotels. On the whole, the tone of the article is favorable to the resorts mentioned, but, reading between the lines, one concludes that perhaps equal benefits may be derived at American health resorts, with less discomfort in reaching the places and better accommodations on arrival.

Dr. Pouzet <sup>211</sup><sub>Oct. 21</sub> gives an excellent account of Davos and the management of consumptives at that resort. He expresses the opinion that the results obtained are less due to the climate than to the thorough and methodical hygienic treatment to which the patients are subjected. In any other climate sufficiently warm and protected against sudden changes similar results could be secured if the patience and co-operation of the sufferer and the energy of the physician held out long enough.

Davos, Görbersdorf, and Falkenstein are the subject of a communication <sup>678</sup> by H. Laden, who, according to Eklund, corresp. ed., points out the similarity of the management in the three sanatoria mentioned, which consists in exposure to cold air, methodical hardening of the skin by frictions, ablutions, and cold douches, and substantial nourishment. At Falkenstein the rest cure is also enforced. Exercise is carefully regulated.

T. Clifford Allbutt <sup>6</sup><sub>Oct. 12</sub> indicates the many advantages of Davos, but insists upon a proper selection of cases to be sent, the necessity for a prolonged *and continuous* stay, and constant medical supervision in order to keep the patient at his best during the time he is undergoing treatment.

Against this almost unanimous verdict in favor of Davos, H. Coupland Taylor states that, far from being uniformly beneficial in the early stages of phthisis, the climate of that place may prove detrimental, as it did in his own case.

John Lowe records <sup>6</sup><sub>Sept. 12</sub> his personal experience in the treatment of phthisis at high altitudes. He points out, what is generally accepted among those most competent to judge, but often

ignored by the mass of the profession, that only in the earliest stages of lung disease, before there is breaking down of tissue, is the mountain treatment beneficial or even justifiable. Patients with cavities are not improved, but, on the contrary, made worse by a residence at high altitudes. When sent before suppuration and fever appear the patients nearly always improve. He prefers Davos.

The climate of the hill stations in Southern India<sup>206</sup> is characterized by rapid changes of temperature during the twenty-four hours, the mornings and evenings being cold and the days very hot. In consequence of these changes, unacclimated persons suffer much from internal congestions, manifested by diarrhœa, dysentery, indigestion, and bronchial and nasal catarrhs. Precautions in dressing, eating, and exposure in the morning and evening will enable one to avoid these unfavorable influences.

The climate of Colorado Springs, according to S. E. Solly,<sup>1042</sup> is suitable especially to persons threatened with tuberculosis, and to patients with fibrous phthisis; cardiac or renal complications contra-indicate the change to Colorado.

W. A. Jayne<sup>9</sup><sub>Nov. 10</sub> contributes an excellent paper on the climate of Colorado and its effects. The paper contains nothing new, but those who desire to inform themselves on the subject may consult the article with much advantage.

B. P. Anderson<sup>59</sup><sub>Mar. 17</sub> urges that the beneficial action of Colorado climate in phthisis is principally due to the aseptic character of the air. Patients should remain until their diseased lungs are cured, a short stay being rarely of permanent benefit.

The advantages of Salida, Colorado, as a resort for consumptives, are stated by V. Kersey<sup>161</sup><sub>Sept.</sub> to be a dry soil, good water supply, clear sky, and moderate temperature.

Cañon City, Colorado, finds an advocate in W. T. Lord,<sup>99</sup><sub>Mar. 8</sub> who writes of its advantages as a health resort. The town is five thousand two hundred and eighty-seven feet above sea-level, sheltered against the west winds by a background of mountains. Its mean temperature for January, 1888, was five degrees higher than that of Denver, which is nearly the same altitude. During this month there was but one cloudy day. The town is an old one, and has, consequently, abundant facilities for the comfort of invalids at reasonable cost. There are also mineral springs with bathing,



facilities. Longer-continued meteorological observations are desirable, and it is hoped that they will be supplied.

L. Huber, <sup>19</sup><sub>Dec. 21, '87</sub> in writing of the sending of phthisical patients to the Rocky Mountains, reiterates the cautions urged by so many writers, namely, that only cases in the earliest stages should be sent to elevated regions.

George Halley <sup>102</sup><sub>Feb.</sub> recommends the climate of New Mexico, especially that of Las Vegas, as a health resort. An analysis of one of the springs made by Professor Haines, of Chicago, is also given, and as the composition of these waters is not generally known it is quoted here:—

Spring No. 6, Las Vegas Hot Springs; temperature, 140° F. (60° C.):—

Carbonate of calcium, . . . . .	0.89 grains.
Carbonate of magnesium, . . . . .	0.15 "
Carbonate of sodium, . . . . .	8.38 "
Carbonate of potassium, . . . . .	0.28 "
Sulphate of sodium, . . . . .	3.35 "
Chloride of sodium, . . . . .	14.68 "
Silica, . . . . .	3.50 "
Alumina, . . . . .	0.10 "
Volatile and organic matter, . . . . .	0.33 "
Carbonate of lithium, . . . . .	traces.
Bromide of sodium, . . . . .	trace.
Total solids, . . . . .	31.65 grains per gallon.

The climate is especially indicated in pulmonary troubles.

Dr. F. H. Atkins writes <sup>59</sup><sub>Apr. 28</sub> that pulmonary diseases of all kinds are exceedingly rare in Las Vegas, as are also degenerative renal diseases. Acute articular rheumatism is almost unknown. Phthisical cases in the early stages are often cured.

The climate is dry, clear, and stimulating. The temperature sometimes falls to ten degrees or more below zero. The altitude of Las Vegas is twelve thousand feet. High winds are frequent from January to May.

Jas. Blake <sup>6</sup><sub>Apr. 14</sub> has records of temperature in some of the uplands of Northern California, "which indicate a climate as near perfection as we can hope to find on this side of Paradise." A mean daily range of seventeen degrees in July and August, with the maximum eighty-two degrees and the minimum fifty-six degrees, at an elevation of four thousand five hundred feet among pine forests, lends strong support to the enthusiastic statement.

## II. BALNEOLOGY.

In the *ANNUAL* for 1888 I called attention to the enthusiasm with which balneotherapeutics were studied by the profession in France and Germany. A new impulse has been given in the former country to the study of mineral waters by a "hydrological pilgrimage" instituted by the Société Française d'Hygiène, under the lead of Dr. Prosper de Pietra Santa, our corresp. editor.

In 1887 these pilgrims visited the important thermal stations in the centre of France. In 1888 the pilgrimage first visited the region of the Vosges, in which are situated many important mineral springs, and then made an excursion into Switzerland, where they studied the sanatoria and climatic health resorts, with their corollaries, the milk-, whey-, and grape- cures.

In each locality, writes Dr. de Pietra Santa, the visits to the thermal establishments and springs under the direction of the medical inspectors or resident practitioners of the springs were object-lessons to the visitors. Conferences were held, during which the indications and contra-indications of each spring were discussed and the conclusions definitely fixed in the minds of the participants.

These two pilgrimages have been completely successful in the objects primarily had in view, and the participants returned to their homes, having gained in health of body, culture of mind, and the pleasant emotions of the heart resulting from genial intercourse with their colleagues.

A detailed account of the excursion of 1887 has been published<sup>104</sup> under the editorship of Drs. de Pietra Santa and A. Joltrain. In addition to a minute report of the social and personal experiences of the pilgrims, which seem to have been uniformly pleasant, and a description of the various resorts visited, the book has appended a number of special reports from the physicians at the various springs. It is not only useful and instructive, but entertaining as well.

An additional stimulus to the systematic study of this subject abroad will doubtless result from the second triennial session of the International Congress of Hydrology and Climatology, which will be held in Paris next October. The United States Government should be represented officially at this Congress, which will discuss questions of great importance to the students of the effects

of mineral waters all over the world. The Secretary-General of the Congress is Dr. de Ranse, 53 Avenue Montaigne, Paris, France, with whom intending participants should communicate.

Victor Audhoui, who has taken up with so much energy the proposition to have an exposition of mineral waters in Paris, devotes several articles<sup>140</sup> to the subject in his journal. He proposes to divide the matter into four subdivisions, of which the first shall consider the soil, the second the waters, the third the thermal establishments, and the fourth the history, literature, and miscellaneous information regarding the springs.

The report of the Committee on Mineral Springs of the American Climatological Association<sup>102</sup> points out the exceedingly unsatisfactory condition of medical hydrology in this country. This was also referred to in the ANNUAL for 1888. Nine-tenths of the mineral waters of the United States still await analysis. The Committee attempted to make a classification based upon therapeutic uses, but the results are not satisfactory. The Committee recommends that a local committee of two persons from each State be formed to carry on the investigation in a scientific manner.

A. C. Peale, of the United States Geological Survey, who has already done so much to make us better acquainted with the mineral springs of our own country, has contributed<sup>1042</sup> an excellent paper containing a scheme of classification of American mineral waters. All mineral waters are primarily divided into non-thermal and thermal, the latter group comprising those whose natural temperature is above 70° F. These groups are subdivided into four classes—alkaline, alkaline-saline, saline, and acid. Each of these classes is again subdivided into divisions corresponding to the most prominent constituent. The paper is a philosophical discussion of the question of classification and deserves careful study.

Dr. Peale<sup>1045</sup> has also furnished a report of the production and value of the mineral waters sold in the United States for the years 1884, 1885, and 1886. The totals show a progressive diminution during the three years. Thus, in 1884 the total production of 189 springs was 10,215,328 gallons, valued at \$1,459,143; in 1885, 224 springs produced 9,148,401 gallons, valued at \$1,312,845, and in 1886, 225 springs produced 8,950,317 gallons, of a value of \$1,284,070. The exports diminished from \$1,529 in 1879 to nothing in 1884-'86. The imports of mineral waters have likewise

decreased somewhat since 1883, when they reached a value of \$448,493, which has diminished to \$375,498 in 1886.

PHYSIOLOGICAL EFFECTS AND GENERAL THERAPEUTICS OF BATHS AND OF  
THE INTERNAL USE OF MINERAL WATERS.

Riess<sup>278</sup><sub>187</sub>,<sup>41</sup><sub>Sept. 13</sub> has found that the quantity of urine excreted was diminished during prolonged warm baths; there was increased excretion through the skin and the body-weight diminished.

The increased excretion of water through the skin is promoted by the softening of the epithelial layer of the skin and the increased passage of fluid outward to the moistened surface through the cutaneous vessel's ducts.

The morbid conditions in which these results were obtained were: dropsy, chronic nephritis, complicated aortic lesions, albuminuria, emphysema, etc.

N. Makovetski<sup>61</sup><sub>Aug. 25</sub> finds that Russian baths diminish assimilation of nitrogenous food principles and increase nitrogenous metabolism. The urine and uric acid are diminished, but loss by the lungs and skin increased. The muscular and nervous systems are strengthened and secretion is increased when much muscular work is performed.

F. Dronke<sup>41</sup><sub>Sept. 13</sub> has found that the external and internal use of the sulphur waters of Schinznach increased the nitrogen in the urine. Sulphates of potassium and calcium were also increased, while phosphates and sodium were diminished, although part of the latter is removed by perspiration.

Pfeiffer<sup>41</sup><sub>Sept. 13</sub> gives the results of some experiments to determine the physiological action of lithium on the urinary secretion. A healthy person to whom alkaline mineral waters, or soda-salts, were administered excreted daily .6532 gramme of uric acid. Lithia-water was now administered containing a daily dose of one-half to one gramme ( $7\frac{1}{2}$  to 15 grains) of carbonate of lithium, and the uric acid fell to .4136 gramme. On stopping the lithia-water two days the uric acid again increased to .6831 gramme. Again giving one gramme (9 to 15 grains) of lithium carbonate in soda-water, the uric acid diminished to .1797 gramme, to rise again to .6248 gramme on the day of suspending the lithia. This seems to indicate that not only has lithia-water no influence in increasing the elimination of uric acid, but that it actually diminishes it. In

the gouty condition, Dr. Pfeiffer would recommend most highly sodium waters, such as those of Vichy, in France, Bilin, in Austria, and Fachingen, in Germany. These are likewise indicated in renal calculus, although here the first in order is Wildungen, then Vichy, and lastly Fachingen. Dr. Pfeiffer adds: "We must demand at the present day that a mineral water which is recommended for gout and urinary calculi shall have been experimentally proven on sick and well persons to increase the solution and elimination of uric acid."

C. Posner<sup>69</sup><sub>Jan. 19</sub> has subjected the question of the solution of uric acid calculi and gravel by means of natural mineral waters and various therapeutic agents to an extended investigation. He found that the urine of persons drinking the waters of Vals (source Désirée), Vichy (source Grande Grille), Fachingen, Wildungen (Helenenquelle), and Salzbrunn (Kronenquelle) would dissolve uric acid, gravel, and sand. The waters were effective in the order above named. Bicarbonate of soda in doses of sixty to seventy-five grains daily, Cantani's powder of bicarbonate of soda, carbonate of lithia and citrate of potash, and borocitrate of magnesia had a similar effect. The natural waters were, however, better borne by the stomach than the drugs. The stronger waters, such as Vals, and the bicarbonate of soda could not be taken for a long period without producing alkalinity of the urine and the danger of alkaline concretions. It is better, therefore, to use the weaker waters, as those of Salzbrunn, the powders of Cantani, or borocitrate of magnesia, which do not render the urine alkaline.

Posner and Pfeiffer have both determined that the solvent effect of urine under the use of the alkaline waters or remedies mentioned remains for several days after the discontinuance of the remedy. Posner therefore recommends that, whichever remedy be employed, the administration should not be continuous, but interrupted every two or three days for a day or two. In this way the remedy could be borne for a much longer time.

As regards dosage of the water, Posner thinks that has little influence upon its solvent properties, the excess of water acting simply as a diuretic. A half bottle of Fachingen water is as efficient as a whole bottle.

M. Hæfler<sup>69</sup><sub>June</sub> has studied the effects of the salts of Krankenheil water upon tissue metabolism. The experiments show diuretic

action, increase of urea, uric acid, and chlorides in the urine, increased appetite, decrease of bodily weight with the same quantity of food, showing increased waste. After suspension of the mineral water the urea excretion sank below the normal, showing increased assimilation of albumen compounds.

London<sup>114</sup><sub>84.13</sub> has made similar studies upon Carlsbad water, but has failed to secure any positive results. Urinary secretion as well as rapidity of excretion is increased. "By diminishing or increasing the amount of water, by giving relatively large amounts at short intervals, or small quantities throughout a longer time, one may produce local effects in the intestinal canal or a general effect in the body."

Dr. Frémont<sup>1046</sup> has found that the waters of Vichy increase the general nutrition by augmenting the richness of the blood, the quantity of hemoglobine, and the activity of reduction of oxyhemoglobine.

He thinks that their usefulness (Grande-Grille) in gastrointestinal disorders is due to the digestive powers of the bacteria contained in them.

Kisch, the distinguished balneologist of Prague, writes<sup>2</sup><sub>Nov.5</sub> concerning the mud-baths of Marienbad. The mud contains a large proportion of iron. The physiological effects of a mud-bath are a sense of warmth throughout the body, oppression in breathing, burning and tingling of the skin, increase of pulse and respiration rate, as well as temperature. The urates in the urine are augmented, but the phosphates diminished.

Therapeutically the indications of these baths are, neuroses, especially in women; paralyses of rheumatic or gouty origin; local puerperal inflammatory exudations, chronic rheumatism, and gout; sexual derangements of females; spermatorrhœa and impotence; abdominal complaints of various kinds; enlargement of the spleen, and intra-peritoneal inflammatory deposits.

Steinschneider<sup>84</sup><sub>Aug.11</sub> argues against the efficiency of baths prepared with the saline constituents of the mud-baths as compared with the baths themselves. He objects that the saline elements are not present in proper proportions, and that the different quantity of specific heat, of the saline solution and the mud mixture, cause different therapeutic effects.

Dr. Ewich expresses the opinion that artificial mineral waters

of definite composition are more trustworthy and efficient as therapeutic agents than natural waters.

The hunt for microbes has extended to the mineral springs. Frémont,<sup>3</sup> of Vichy, and M. Percepid,<sup>3</sup> of Mont-Dore, have found micro-organisms of various kinds in the waters. The former suggests that the action of Vichy water in digestive derangements may be due to the activity of these organisms in peptonizing albuminous foods when introduced into the intestinal canal.

C. Reinl,<sup>84</sup> has examined various bottled mineral waters with reference to micro-organisms contained in them. Leone, Sohnke, and Hochstetter had previously studied this question. Reinl examined Gieshübler, Krondorfer, Franzensbad, and Apollinaris water and found abundant growth of bacteria in cultures from all of them. He concludes that the bacteria are not present in large numbers in the waters at the springs, but get into the bottles while the latter are empty and awaiting filling. He draws the further inference that the presence of an excessive number of micro-organisms in bottled mineral waters may account for the less favorable effects of such waters when they are consumed at home than when taken at the sources. This seems a very cleverly contrived and apparently highly scientific reason for a sojourn at the springs.

A. L. Carroll,<sup>40</sup> is skeptical of the effects ascribed to mineral waters and ridicules all therapeutic claims made for these agents. While the preposterous claims made by the proprietors (and not a few physicians) for most springs are properly ridiculed, the general denunciation of mineral waters is hardly justified. In connection with this matter attention may be called to a letter sent by the French Society of Medical Hydrology to the Society of Surgery, in which the former protests against insinuations uttered in the latter on the occasion of the reading of a report on the hydrological treatment of tuberculosis of bone. The surgeons not only discredited the report, but reflected somewhat severely upon the honesty of spa doctors in general. The protest states that the clinical studies pursued at thermal stations are as honest and interesting as any others, and that the representatives of thermal clinics (namely spa doctors) have the same right to a fair and just criticism as the representatives of other clinics. The distinguished and dignified surgeons got out of the hole into which they had

been placed by declining to receive or discuss the protest, on the ground that the official report of the meeting had not been published.

Geo. E. Walton,<sup>279</sup> of Cincinnati, the veteran hydrologist of the United States, in a paper on the therapeutics of mineral waters divides these agents into alkaline, saline, calcic, purgative, and sulphur waters. The alkaline waters (Vichy, Buffalo Lithia, Apollinaris, and Gieshübler) are indicated in gout, diabetes, dyspepsia, and uric acid gravel. Saline waters (Congress, Hathorne, and other Saratoga springs) are useful in chronic gastric catarrh, gout, and chronic bronchial catarrh.

Calcic waters (Bethesda, Clysmic) are beneficial in diseases of the bladder, ureters, and kidneys.

Purgative, or bitter waters (Carlsbad, Hunyadi-Janos, Rubinat-Condal), are used as simple purgatives and in various hepatic diseases, enlargement of the spleen, diabetes, and corpulence.

Sulphur waters (Red Sulphur and Greenbrier White Sulphur in Virginia, Sharon, Lower Blue Lick, Ky.) are useful in chronic bronchial, laryngeal, and pharyngeal catarrhs, phthisis, and in lead poisoning.

In gastro-hepatic diseases Pepper<sup>1042</sup> finds mineral waters useful, as they aid in removing effete material from the system. Time and mode of administration, diet, and exercise should receive more careful attention. The morbid conditions benefited by their use are gastric atony, catarrh, dilatation, congestion of liver, gallstones, and abdominal engorgement.

In urinary and arthritic diseases A. H. Smith<sup>1042</sup> believes those mineral waters containing least mineral matters to be the most beneficial. He instances Gettysburg and Clysmic waters as examples.

C. Reinl<sup>406</sup> has made exact researches into the effect of mineral waters in anæmic conditions, and has arrived at the conclusions that a ferrated arsenical water (Levico) or a chalybeate (Franzensbad) increase the number of blood-corpuscles in cases of chlorosis and anæmia. The effects of the water are more marked if there is at the same time improvement in the food and hygienic surroundings of the patient. Stimulating baths increase the effect of the internal use of chalybeate waters.

The Society of Physicians and Naturalists, of Jassy, Rou-



mania, is manifesting great energy in the development of the mineral waters of Moldavia. G. Cobalesco,<sup>223 Jan. 27</sup> writes on the springs of Calimanesti and Cacilata, and Dr. S. Konya<sup>223 Mar.</sup> on the existence of a sulphur water at Jassy.

Rubinat purgative water, according to Boutarel,<sup>10 Apr. 3</sup> is derived from two springs, the Fuentes Amargas and Condal. The former is the stronger in saline constituents. M. Boutarel has also studied the effects of nitrogenized mineral waters, especially at the springs of Panticosa, in the Spanish Pyrénées. The waters are especially beneficial in phthisis, emphysema, malaria, syphilis, anæmia, and various painful affections of the stomach. The physiological effects are those of sedation. Nervous excitability, cough, diarrhœa, and sexual desire are diminished.

Boutarel has studied, also, some of the other less-known Spanish springs. Among these are Urbernaga de Ubilla, where diseases of the urinary organs are treated; the sulphurous saline springs of Zaldibar; the nitrogenized waters of Caldos de Oviedo, which exercise a sedative action upon the respiratory and circulatory systems; Urbernaga de Arzola, a nitrogenized water with strongly diuretic properties; Arlanzon, where neuralgias and pulmonary affections are treated; Larrauri, where incipient tuberculosis, chronic laryngitis, and congestive disorders of the pulmonary organs are benefited; La Aliseda, where chronic laryngitis, incipient tuberculosis, intermittent fevers, chlorosis, and biliary and renal lithiasis are successfully treated.

A new purgative bitter water has been discovered at Rolla, in Central Missouri. It is a carbonated, mild alkaline-sulphate water, containing a pretty large proportion of calcium carbonate. It is said to be not unpleasant to the taste, according to R. L. Johnson,<sup>82 July 26</sup> and to be cathartic and diuretic.

#### SPECIAL THERAPEUTICS OF MINERAL WATERS.

The overwhelming volume of literature upon the therapeutic uses of various mineral waters which has appeared during the year prevents more than the merest reference to individual papers. A summary of therapeutic indications is given in a condensed form, with references to the original publications.

*Gastric and Intestinal Derangements.*—Jaworski,<sup>113 Jan. 15</sup> asserts that recent observations have shown that the larger proportion of

gastric disorders is due to an excess of hydrochloric acid, and that a rational therapeusis should counteract, instead of fostering, the acidity of the stomach, as the methods of treatment of these affections at present in vogue tend to do. He refers to observations of Reichman, Riegel, Boas, V. d. Velden, Rothschild, and Korczynski as sustaining the claim that gastric affections are, in the large proportion of cases, due to hyperacidity. He then shows that the administration of small quantities of Carlsbad water or salt will promote the secretion of acid and the digestive power, but that larger quantities long continued will decrease or entirely suspend the secretion of acid and pepsin and give rise to a "mucous catarrh."

These facts indicate the manner in which Carlsbad waters produce their therapeutic effects in gastric affections. The first indication is to diminish the excessive secretion of acid, upon which the majority of these cases depends. The physiological action of Carlsbad water explains its good therapeutic effects in so many cases of gastric diseases.

Jaworski thinks the retardation of digestion in hyperacidity of the stomach is partly due to a reverse peristaltic action of the duodenum, by which the contents of the latter viscus, including the bile, is forced back through the pylorus into the stomach. Examination of the contents of the stomach in these cases showed the presence of bile.

Sandberg and Ewald<sup>365</sup><sub>Nov. 10, 18; 5 Sept.</sub> made a series of experiments with Carlsbad water and secured results, of which the following is a summary, differing in many points from those of Jaworski:—

1. Carlsbad water is a powerful gastric stimulant, so much so that half an hour after its ingestion it is often possible to demonstrate the presence of hydrochloric acid in the stomach contents.
2. After a four to five weeks' course of treatment no diminution in the secretion of pepsin could be noticed.
3. The same is true of the rennet (milk-curdling) ferment.
4. In those cases in which, before treatment, the acidity was rather below normal, the secretion of pepsin and of rennet was increased.
5. Carlsbad water stimulates gastric activity more powerfully than common water of the same temperature.
6. Absorption occurs very quickly, a half-pint disappearing in fifteen to forty-five minutes.
7. Absorption takes place more rapidly at temperatures of from 122° to 131° F. (50° to 55° C.) than at lower ones of 68° to 104° F. (20° to 40° C.).

Dr. Carl Klein,<sup>113</sup> contributes a paper on the balneological treatment of nervous disorders of the stomach. An attempt is made to classify the cases which are benefited by such treatment. In one class of cases, for example, in pure neuroses in which normal chymification is not interfered with, the treatment is to be based on general principles. For such cases, mountain climate, sea-air, and sea-bathing are indicated. In general the air of moderate altitudes is preferable to the sea-coast in weak and depressed individuals. Sea-bathing and life at the sea-shore are better for persons of more robust constitution, who are better able to resist the stimulating influence of the bracing sea-air.

In nervous dyspepsias, in which the gastric disturbance is dependent upon some functional or structural trouble of another organ, the general tonic treatment must be combined with local measures directed to the stomach as well as to the organ primarily at fault. In these cases saline and chalybeate waters, together with cold or hot salt or mud baths, are indicated.

Chalybeate and arsenical waters are indicated when there is anæmia and chlorosis, but should be avoided when there is any inflammatory condition of the gastric mucous membrane.

Among other waters recommended especially in disorders of the gastro-intestinal canal are Plombières,<sup>1047</sup> Homburg (Dunlop<sup>213</sup>), Hunyadi-Janos, which is lauded in an extravagant manner by Dr. Pol. Vernon,<sup>108</sup> in the treatment of "embarras gastrique et gastro-hépatique,"—in other words, what American doctors would call a "bilious attack" (a small dose of the water every other day for a week will relieve the symptoms); Saratoga (T. Herring Burchard<sup>19</sup>), Prades,<sup>17</sup> Brides-les-Bains (Delastre<sup>2</sup>), Blanc,<sup>6</sup> Bedford (Enfield<sup>62</sup>), and Friedrichshall, which is highly recommended by S. Guttmann<sup>60</sup> as a pleasant and efficient purgative, especially applicable in chronic constipation.

*Gout and Rheumatism.*—Pistyán, in Hungary, has long been noted for the therapeutic efficacy of its mud-baths in chronic rheumatic and gouty affections of the joints. In recent articles Sir Spencer Wells<sup>2</sup> and V. Mosetig-Moorhof<sup>113</sup> laud the place very highly for the above-mentioned affections as well as for chronic inflammatory infiltrations, chronic metallic poisoning, bone diseases, etc. The water in the baths varies from 86° to 104° F. (30° to 40° C.). The mud-baths which are the distinctive feature of Pistyán

are from two and a half to three feet deep, and vary in temperature from 100° to 105° F. (38° to 40.5° C.). Both the water and mud contain sulphuretted hydrogen.

Among other waters specially recommended in gout, rheumatism, neuralgia, and those diseases generally supposed to be due to an excess of uric acid in the blood, are Bath (Kent Spender, <sup>60</sup><sub>Sept. 1</sub> Craddock <sup>2</sup><sub>Oct. 27</sub>), Woodhall, <sup>16</sup><sub>Mar.</sub> Contrexéville (Burney Yeo, <sup>15</sup><sub>June</sub> Debout d'Estrées <sup>14</sup><sub>May 16</sub>), Vittel, Bourbonne, Plombières (Yeo, <sup>15</sup><sub>June</sub> Botten-tuit<sup>1047</sup>), Aix-les-Bains (Ringier, <sup>214</sup><sub>July 1</sub> McRoc <sup>228</sup><sub>June 15</sub>), Royat (Fredet, <sup>1048</sup><sub>Petit<sup>1049</sup></sub>), La Preste, <sup>70</sup><sub>Aug. 12</sub> Hammam R'hira (Gibbons <sup>6</sup><sub>June</sub>), Louèche (De la Harpe<sup>1050</sup>), Ems (Quinlan <sup>16</sup><sub>May</sub>), Bégles, <sup>188</sup><sub>Jan. 16</sub> Droitwich (Crespi <sup>131</sup><sub>Mar.</sub>), Kemmern, in Russia (Berg <sup>21</sup><sub>Apr. 28</sub>).

*Diseases of the Urinary Organs.*—Kopf <sup>2</sup><sub>Oct. 20</sub> recommends the alkaline Chalybeate water of the Marienbad Rudolfsquelle in chronic catarrh of the bladder, lithiasis, pyelitis, neuroses of the bladder, and renal and vesical calculi. Other waters recommended in the same or similar conditions are Ems, Woodhall, Homburg, Bedford, Contrexéville, and Saratoga,—all referred to above.

*Diabetes.*—B. Hofmeister <sup>2</sup><sub>May 6</sub> writes of the treatment of diabetes at Carlsbad. After special dietetic directions and advising warm baths (93° to 94° F., 34° C.) for fifteen minutes twice a week, he states that Carlsbad waters are undoubtedly of great use in diabetes. Their effect is mostly due to the alkaline salts they contain. Drinking the water at Carlsbad is much more efficacious than drinking it at home. In severe cases the treatment should be carried out twice a year, in the spring and autumn.

Among other waters recommended in this disease are Royat, Brides (Philibert, <sup>17</sup><sub>Mar. 16</sub> Blanc), Ems, Saratoga, Contrexéville, and Woodhall.

*Various Hepatic Affections.*—Vittel (Rodet <sup>184</sup><sub>July 15</sub>), Contrexéville, Brides, Bedford, Saratoga, Ems.

*Uterine Diseases.*—Ems, Brides, La Preste, Royat, Cauterets (Lamarque, <sup>10</sup><sub>Apr. 3</sub>), Contrexéville, Martigny, Capvern, and Vittel (Mabboux, <sup>67</sup><sub>May 20</sub>).

*Diseases of the Nervous System.*—Kisch <sup>150</sup><sub>Mar.</sub> advises mineral-water treatment in hypochondria. In those cases due to or associated with chronic constipation, flatulence, and hæmorrhoids, and in climacteric hypochondria the waters of the Marienbad Kreuzbrunnen are especially indicated. Cases in which urinary concre-

tions are causes of the hypochondria are better treated with Carlsbad waters. The chloride of sodium waters of Kissingen and Homburg are indicated in the hypochondria of strumous constitutions. In anæmia, neurasthenia, menorrhagia or amenorrhœa, and sterility in women, and involuntary seminal emissions in men, when combined with hypochondria, the Chalybeate waters of Marienbad (Ambrosius-brunnen), Franzensbad, Pyrmont, Schwalbach, and St. Moritz are to be recommended.

In cases in which the hypochondria is associated with spinal irritation or arthritic affections iron, salt, sulphur, or mud baths should be combined with the internal use of the properly indicated mineral water.

The waters of Nérís (Morice<sup>1061</sup>) are also useful in nervous disorders of various kinds.

*Anæmia, Chlorosis, and other Debilitating Conditions.*—Salins-Moutiers (Delastre<sup>2</sup>), Franzensbad (Reinl), Schinznach, (Tymowski,<sup>177</sup> Aug.) Saratoga, Brides, Homburg.

*Heart Diseases.*—Wiborg, according to Dr. Eklund, corresp. ed., recommends the waters of Nauheim in heart diseases, especially in dilatation. Remarkable success is said to attend the treatment of these affections. In addition to the baths, gymnastic exercises, mountain climbing, and, in some cases, horseback riding are advised. Bode<sup>1062</sup> likewise calls attention to the value of Nauheim in heart disease, but is not so enthusiastic as Wiborg.

*Corpulence.*—Homburg, Brides (Bondonneau<sup>70</sup> Nov. 13).

*Laryngeal, Pulmonary, and Pharyngeal Catarrhal Affections.*—Ems, Bedford, Royat, Cauterets, Mont-Dore, especially in hay asthma.<sup>1063</sup>

*Syphilis.*—Royat, Cauterets, St. Honoré,<sup>1064</sup> Kemmern.

*Malaria.*—W. C. Van Bibber<sup>104</sup> Nov. 10 recommends the Greenbrier White Sulphur Springs, in Virginia, in malarial diseases. He has devised two plans of treatment, which he calls the "two weeks'" and the "four weeks'" plans. The first consists in drinking as much of the water, early in the morning, as is necessary to produce one or two loose, watery evacuations from the bowels and free diuresis. The quantity usually required is two to four glasses. Breakfast should not be taken for two hours after drinking the last glass of the morning dose. At noon a warm bath (94°–98° F.) of the sulphur water should be taken, remaining in

the bath fifteen to twenty minutes. Two or three glasses of the water should be taken while in the bath. Dinner or lunch should be taken soon after leaving the bath (about 2 P.M.). At 5 P.M. two glasses of water should be drunk, and again two before retiring. The toilet, morning and evening, should be made with the aid of the sulphur water. During the day free pedestrian exercise should be indulged in. In the "four weeks'" course, which should be preferred when practicable, the bath is ordered every other day, and the quantity of water taken daily should be proportionally reduced. During the course of the treatment the appetite increases, vigor improves, and there is greater buoyancy of mind.

At Saratoga, N. Y., the same course of treatment may be followed. The Congress, Hathorn, Hambleton, and Washington Springs are used as drinking waters, and the Putnam, White Sulphur, and Red Springs for bathing and lavatory purposes.

Strathpeffer (Fox<sup>2</sup><sub>Nov. 8</sub>), Homburg, Brides.

*Scrofulous Affections*.—D'Espine<sup>187</sup><sub>Sept. 20</sub> reports on the results of sea-bathing for scrofulous children. From 1881–1887 (the year 1884 was omitted on account of cholera on the Mediterranean) three hundred and fifty-two sick children were sent from Geneva to Cette, in Southern France. Of these seven-eighths suffered from scrofulous affections. The youngest was four and a half years, the oldest fifteen years of age. Of the three hundred and eight scrofulous cases forty-eight were cured, two hundred and fifteen improved, forty-one not improved, three aggravated, and one died, the latter in consequence of an accidental pneumonia. The duration of the season was six weeks, from the end of June to the beginning of August, and each child received on an average from forty to forty-five salt-water baths.

At Cannes a winter asylum has been established. The season lasts from October 1st to May 31st. Open-air baths are suspended from December 27th to January 11th. The children receive about twenty baths per month. The medical treatment consisted of cod-liver oil, phosphate of lime, salted milk, and infusion of hops. The surgical treatment was conservative. Of forty-one children sent to this asylum for treatment from 1882–1887 twenty-seven were cured, nine much ameliorated, three not relieved, and two died.

These results show the importance of a prolonged stay at the

sea-side in cases of scrofulous diseases in order to obtain the advantage of three factors: (1) sea-air; (2) sea-bathing; (3) outdoor life during winter in a warm atmosphere.

In a long but exceedingly interesting paper, J. Casse,<sup>52</sup> gives additional testimony to the value of sea-side hospitals in the treatment of scrofula and tuberculosis. The mere residence at the sea-shore will cure a number of cases of scrofula without any additional medical or surgical treatment, but, properly aided by the latter, marvelous results are obtained which could not be attained by either alone.

A correspondent,<sup>6</sup> gives some information respecting the sea-side hospitals for scrofula and rickets in Italy. The Latin shore has been moderately well supplied with these institutions, which were started by the Papal Government thirty years ago, and more recently Palermo has also established a sea-side hospital. Benevolent laymen and women co-operate with the profession and government in endeavoring to enhance the usefulness of these institutions. Railroads give free tickets for the transport of the afflicted, and financial establishments subscribe liberally for their support.

E. Friedrich,<sup>41</sup> gives a description of the various sea-bathing stations in the North Sea. Those more particularly described are the stations Westerland, Marienlust, Wenningstedt, and Kampen upon the island of Sylt, Wyk upon the island of Fohr, and the National Sea-side Home for children on the island of Norderney. Of these Westerland, Wyk, and Norderney are the most important.

DeValcourt,<sup>2</sup> lauds winter sea-bathing in scrofulous diseases. An institution has been opened at Cannes and very favorable results have already been obtained.

In a very practical paper on sea-bathing J. Baratoux,<sup>290</sup> gives an account of the various methods of taking sea-baths, the precautions to be taken while bathing, the physiological effects, and the hygienic, therapeutic, and contra- indications.

Marcel Baudouin,<sup>73</sup> gives an interesting description of the new sea-side sanatoria built at Arcachon and at Hyères-Giens. The first is due to the efforts of Dr. Armaingaud, of Bordeaux, and the latter to those of Dr. E. Vidal, of Hyères. France still seems to lead in its provisions for the rational management of scrofulous children.

Reclus,<sup>73</sup> speaks in the highest terms of the waters of

Barèges, France, for tuberculosis of the bones, and reports six patients from thirteen to twenty-one years of age in whom permanent cure was obtained by two seasons of Barèges without surgical intervention.



## MEDICAL DEMOGRAPHY.

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THE material for a system of vital statistics has been vastly augmented during the past year. In the United States and Europe, as well as in South America, Egypt, India, and Australia, monthly and weekly reports of mortality are now regularly published. In this shape, however, these returns are chiefly of interest as evidence that such occurrences are matter of record. The fluctuations, in weekly returns especially, due to temporary increase of deaths or to omissions or other errors on the part of reporters, are so great that the apparently healthy city of one week may at the next exhibit the highest mortality. The varying estimates of population on which death-rates are calculated constitute another source of numerical inexactness, as illustrated in the case of Glasgow—the population of which was estimated by Dr. Russell,<sup>2</sup> the Health Officer, to be 551,435, arrived at by multiplying the number of inhabited houses, 114,863, by 4.745, the average number of inhabitants per house in 1881, and adding the number of inmates in institutions as ascertained by special census, 6,410, the total exceeding the estimate of the Registrar-General by 25,347, making a difference of fully 1 per centum in the death-rate. A single page from a sanitary journal,<sup>172</sup> aggregating the weekly mortality rates of nearly four hundred towns in all parts of the world, as published piecemeal in their several periodicals, will demonstrate their unreliability as statistical indications of sanitary condition and the impossibility of condensing them for exhibition in an annual survey of this character. This must be the work of a central bureau in each country, which shall present results arrived at upon a uniform, exact, and complete system of calculation for effective comparison and inference as to laws of causation, deterioration, or improvement. The value of even such a publication as the *Statistique Sanitaire des Villes de France*, in which the facts for a period of twelve months have been summarized

as a basis for calculating the mortality statistics for the fifty-one French towns which at the time of the census of 1886 had a population exceeding thirty thousand, is impaired by such deficiencies as calculated rates to living population, rendering the bare figures of mortality useless for comparison.

The most complete and accurate statistical compilation of this period is the "Report on the Mortality and Vital Statistics of the United States as Returned at the Tenth Census (June 1, 1880)," prepared by J. S. Billings. The final summation of this extensive work represents the mortality rate of the United States for the census year as 15.09 per 1000 of surviving population, being an increase over the death-rates of former censuses. The author of the report, however, explains that this increase must not be regarded as establishing an actual increase in the number of deaths in proportion to living population, but rather as indicating a more complete collection of the data upon which the death-rate is based; <sup>5</sup> and yet a careful study of the statistics of States and cities in which the registration is probably very nearly accurate demonstrates the existence of deficiencies in returns from other places which induced the compiler to place the actual death-rate for the whole country at 18 per 1000 of living population.

As stated by me in the ANNUAL last year, mortality rates alone are insufficient for the purposes of the medical demographer, and for the first time in the history of the United States Census its compiler has attempted to obtain *morbidity* or sick-rates. A portion of the country was selected sufficiently large to give a fair indication of the relative proportion of the sick of the whole population over fifteen years of age in every 1000 living on a given day (June 1st). The result shows the number to have been 12.75 per 1000 living, which appears to be a fairly accurate proportion, judging from the data furnished from mutual benefit societies in this and other countries and the especially reliable data of the State of Rhode Island. If the annual death-rate is taken at 18 per 1000, the average number of persons above fifteen years constantly sick is 36 per 1000 of living population.

Another valuable feature of the Census Report of 1880 is the tabular exhibit of "expectation of life," for the first time there presented, and affording a very instructive and thorough means of comparison of the healthfulness of different localities.

Stanford E. Chaillé, <sup>12</sup><sub>Aug</sub> in an article on "The Life and Death Rates of New Orleans as Compared with Other Cities," publishes the following compilation, exhibiting the expectation of life of the white population alone of fourteen localities in the United States for 1880 only, the data as to population being derived from the United States Census for 1880, and as to deaths from reports of local boards of health:—

AGES.	New Orleans.	Charleston.	New York.	San Francisco.	Brooklyn.	Boston.	Cincinnati.	Baltimore.	District of Columbia.	Philadelphia.	St. Louis.	Chicago.	Massachusetts.	New Jersey.
0	38.10	38.34	35.02	41.32	38.61	38.08	40.44	38.18	42.36	41.83	38.86	39.70	44.64	46.82
1	46.10	45.30	43.70	48.68	45.94	46.65	48.44	46.04	49.34	49.54	51.29	47.30	51.19	53.44
2	48.25	48.84	47.94	49.94	49.66	49.84	51.26	49.80	51.81	51.56	54.32	50.16	53.18	55.05
3	48.54	48.50	48.90	50.16	50.66	50.52	52.16	51.05	52.21	52.24	54.40	52.00	53.74	55.54
4	48.45	48.22	49.20	50.08	50.97	50.00	52.32	51.58	52.20	52.80	54.15	52.74	53.90	55.48
5	47.88	48.10	49.14	49.54	51.02	50.86	52.06	51.72	51.85	52.02	53.70	52.10	53.80	55.18
10	44.16	44.24	45.91	45.76	48.62	47.86	49.11	49.66	48.71	48.56	50.04	51.12	50.97	52.04
15	39.84	40.18	41.62	41.38	44.42	43.68	44.78	45.46	44.38	44.30	45.76	47.10	46.86	47.88
20	35.80	36.24	37.64	37.42	40.36	40.14	40.76	41.50	40.42	40.37	41.73	43.20	43.29	43.90
25	32.34	32.72	34.20	34.00	36.94	36.89	37.20	38.06	36.72	37.01	37.97	39.52	40.12	40.48
30	29.85	30.08	31.11	30.88	33.70	33.84	33.81	34.74	33.64	33.84	34.65	36.02	36.83	37.01
35	26.36	27.46	28.02	27.78	30.45	30.68	30.41	31.42	30.54	30.68	31.34	32.53	33.54	33.54
40	23.78	24.60	25.08	24.85	27.23	27.36	27.18	28.05	27.36	27.46	28.08	29.05	30.13	30.00
45	21.21	21.75	22.14	21.92	24.01	24.04	23.96	24.67	24.19	24.24	24.82	25.58	26.72	26.47
50	18.62	18.80	19.24	19.20	20.86	20.90	20.77	21.27	21.06	21.12	21.79	22.14	23.22	23.02
55	16.04	15.84	16.34	16.50	17.71	17.76	17.58	17.86	17.92	17.98	18.76	18.70	19.72	19.56
60	13.56	13.14	13.76	13.83	14.96	14.98	14.66	15.01	15.01	15.12	16.12	15.70	16.62	16.50
65	11.12	10.44	11.19	11.36	12.21	12.22	11.75	12.17	12.10	12.26	13.50	12.68	13.52	13.44
70	9.43	8.81	9.44	9.44	10.16	10.08	9.76	10.24	9.88	10.19	11.86	10.50	11.12	11.01
75	7.74	7.18	7.70	7.51	8.20	7.94	7.77	8.32	7.86	8.12	10.23	8.31	8.72	8.57
80	6.73	6.59	6.25	7.24	6.90	7.14	6.74	7.14	6.70	6.10	9.31	7.29	7.34	7.38
85	5.72	6.00	5.60	6.96	5.69	6.33	5.71	5.98	5.54	5.68	8.40	6.28	5.97	6.20

The greater expectation of life in the States of Massachusetts and New Jersey, due to the large rural population represented, accords with the otherwise established fact that life is longer in the country than in cities, chiefly from the less mortality in the former of children under five years of age and from consumption, diarrhoeal diseases, and affections of the nervous system.

In the absence of complete series of uniform national statistical returns, which might serve as basis for collation and comparison, a cursory review of such individual reports as have been submitted to me will be all that can be here attempted.

*Density of Population.*—The mean density of population of the whole earth is stated by Victor Turquan <sup>208</sup><sub>May 13</sub> to be ten inhabi-

tants to the square kilometre (25.9 to the square mile), the several grand divisions of the globe being peopled as follows :—

Europe, 34 inhabitants to the square kilometre, or 88	to the square mile.
Asia, 19 “ “ “ “ “ “ 49	“ “ “ “
Africa, 6 “ “ “ “ “ “ 15	“ “ “ “
Oceanica, 3 to 4 “ “ “ “ “ “ 8-10	“ “ “ “
America, 2 to 3 “ “ “ “ “ “ 5- 8	“ “ “ “

Levasseur's<sup>718</sup> estimates of the relative density of population of the principal European States is for

Belgium, . . . . .	201 inhabitants to the sq. kilometre, or 520 to the sq. mile.
Holland, . . . . .	138 “ “ “ “ “ “ 344 “ “ “
Great Britain and Ireland, . . . . .	119 “ “ “ “ “ “ 308 “ “ “
Italy, . . . . .	105 “ “ “ “ “ “ 272 “ “ “
Germany, . . . . .	86 “ “ “ “ “ “ 222 “ “ “
France, . . . . .	72 “ “ “ “ “ “ 186 “ “ “
Switzerland, . . . . .	70 “ “ “ “ “ “ 181 “ “ “
Austria-Hungary, . . . . .	59 “ “ “ “ “ “ 153 “ “ “
Portugal, . . . . .	50 “ “ “ “ “ “ 129 “ “ “
Spain, . . . . .	34 “ “ “ “ “ “ 88 “ “ “
Greece, . . . . .	31 “ “ “ “ “ “ 80 “ “ “
Turkey, . . . . .	27 “ “ “ “ “ “ 69 “ “ “
Russia, . . . . .	17 “ “ “ “ “ “ 44 “ “ “
Denmark, . . . . .	15 “ “ “ “ “ “ 39 “ “ “
Sweden, . . . . .	11 “ “ “ “ “ “ 28 “ “ “
Norway, . . . . .	6 “ “ “ “ “ “ 15 “ “ “

The matter of overpopulation in parts of Europe is attracting popular attention and has been made the subject of committee inquiry<sup>2</sup> in England. Civilization is said to be threatened by a kind of law of the survival of the unfittest, traceable to a mere surplus of numbers, since it is, generally speaking, the most ignorant and least worthy classes which multiply most rapidly.

J. B. Russell<sup>90</sup> has forcibly shown the consequences of overcrowding in Glasgow. Of the population of 511,520 (census of 1881), 25 per centum (126,000) lived in one-room tenements and 45 per centum (228,000) in two-roomed houses. “It is these small houses which produce the high death-rate of Glasgow and give to that death-rate the enormous proportion of deaths in childhood. Their exhausted air and poor and perverse feeding fill our streets with bandy-legged children.” In these houses the death-rate is 38 per 1000 ; in districts with larger houses, 16 to 17. Thirty-two per centum of the children who die in Glasgow under five years of age die in one-room tenements. The decreasing prevalence of typhus, both in Dublin and Cork, is

attributed by Dr. Donovan<sup>2</sup><sub>Apr.14</sub> to the reduction in overcrowding, the improved condition of tenements, and the regular inspections to which they are now subjected.

London's death-rate has been reduced from its high figure at the beginning of the century, and to-day it is the most healthful of the great metropolitan cities of the world. According to Dr. Roger S. Tracy,<sup>1</sup><sub>Apr.21</sub> Registrar of the New York Board of Health, overcrowding in New York to the extent of 16.37 persons to a dwelling in 1880 as compared with 7.8 in London is such as to render it impossible that the death-rate of New York can ever be reduced as low as that of London. The population of the latter is 4,149,533; the average annual mortality for twenty years, 79,109. The population of New York is 1,439,037; the average annual mortality for the same period, 30,487, which, amplified to the population of London, would be 102,780, an average annual excess of 23,671 deaths.

The forty-fifth registration report<sup>99</sup><sub>Sept.10</sub> of Massachusetts, 1886, shows that the death-rate in that State was 19.7 per 1000 of the living population in the six manufacturing or urban counties, containing nineteen of the twenty-three cities of the State, where the density amounted to 442 to the square mile, and in the eight agricultural counties, of which the average density was less than 100 per square mile, it was only 17.7. The effect of density is further illustrated by comparing the quinquennial period ending 1854 with that ending 1886, in which time the population had nearly doubled and the density increased from 120 to 233. The death-rate, notwithstanding sanitary advances, had also increased from 18.4 to 19.5.

The returns of the Registrar-General for England and Wales<sup>6</sup><sub>Oct.6</sub> for the thirteen weeks ending in October (1888) show that the mean annual death-rate in the twenty-eight large towns dealt with in the returns did not exceed 16.9 per 1000 for the third or summer quarter of this year, that of London being 16.2 and of the twenty-seven large provincial towns 17.5, the lowest of these, Bristol, with 12.7, and the highest, Manchester, with 23.5. Probably the death-rate for all England and Wales for the same period was below rather than above 15 per 1000. The lowest previous death-rate for this period in the whole country since the commencement of civil registration in 1837 was 16.3 in 1879.

The London *Lancet*, commenting on the practical ignorance of the causes of the wide-spread differences between the rates of mortality in various neighboring English towns, says: "With regard to the mortality from diarrhœa in these large towns last quarter (July-September), it is worthy of note that it did not reach its maximum until the first week in September, and this increase was not, apparently, due to any rise of temperature, as the mean temperature in the preceding two weeks had shown a marked deficiency. It would appear that we know definitely as little of the conditions which govern the general mortality from summer diarrhœa as of the causes to which the marked variations in its incidence upon various towns are to be attributed."

The effect of geological structure on the health of communities was illustrated by Dr. Grimshaw, Registrar-General for Ireland,<sup>2</sup> at the Section on State Medicine of the Royal Academy of Medicine in Ireland. The death-rates from typhus, enteric fever, and principal zymotic diseases in general during the past eight years had been as follows:—

	1881.	1882.	1883.	1884.	1885.	1886.	1887.
Typhus . . . . .	0.70	0.30	0.52	0.30	0.18	0.11	0.07
Enteric fever . . . . .	0.35	0.40	0.37	0.42	0.42	0.38	0.38
Principal zymotic diseases . . . . .	2.80	2.81	3.52	3.57	3.47	2.22	5.12

The fact that enteric fever had not diminished, while typhus had, and that its high rate maintained in Dublin, situated in a country with a low enteric death-rate, was relatively higher than in London, situated in a country with a higher rate, made it clear there were conditions in Dublin favorable to its spread, and these were found in the pervious strata of sand and gravel formed by an old raised sea-beach, on which the especially fatal portions of the city were situated. This gravel-bed lay in clay and rock, so that it retained all the fluid filth cast upon it or soaked into it from the river, and might be considered to be like a basin of dirty water placed in the middle of the city, over which houses are built for 80,000 people.

Madrid<sup>2</sup> has long enjoyed the unenviable notoriety of being one of the least salubrious cities in Europe, the average annual mortality rate for the period from 1880 to 1887 having been 41.2

per 1000 (in the latter year, 39.69), and only exceeded by St. Petersburg and Buda-Pesth. During the past summer the exceptional prevalence of diphtheria and small-pox raised the death-rates to 45 per 1000 and aroused public attention. The Central Board of Health declared that, while various physical conditions combine to render the climate of Madrid trying and unhealthy, local municipal sanitary neglect was the principal cause, and the excessive watering of the streets one of its instances, with poor drainage, uncovered drains, etc.

*Birth- and Death-rates.*—The annual statistics of the Empire of Russia for 1884-'5, <sup>18</sup><sub>Sept.</sub> published at St. Petersburg in 1887, places the total population of the Empire at that time at 108,787,235, of which 54,063,353 were males and 53,888,042 females, a proportion of 1003 of the former to 1000 of the latter. Less than 13 per centum of this enormous population live in towns, to wit: 13,947,825, of whom 7,280,037 are males and 6,614,592 females, the former being in the relatively greater number of 1100 to 1000. The town-dwellers in Russia are thus outnumbered by the similar class in Great Britain and Ireland, with a population only one-third as large.

The children born in Russia during 1885 numbered 4,597,441 (41 per 1000 of population), of whom 2,365,278 were males and 2,232,163 females, a ratio of 1059 males to 1000 females; 5.5 per centum of the births, 129,700, were illegitimate, 1400 of these being males to every 1000 females.

The deaths during the corresponding period amounted to 3,291,824 (32 per 1000), of which 1,702,791 were of males and 1,589,033 were of females, or 1071 males to 1000 females.

According to Mr. Ch. Grad, <sup>208</sup><sub>June</sub>, the number of inhabitants of the German Empire, including those of Alsace-Lorraine, on the 1st of December, 1885, was 46,885,000, an increase of 6,039,000 in fifteen years, an annual average gain of 402,600, or at the rate of 1 per centum a year.

This population, distributed over the 540,518 square kilometres (208,700 square miles) of territory constituting the German Empire, gives a mean specific population of 86 persons to the square kilometre (224 to square mile). The density of population of the several States varies greatly, there being in Saxony 198 inhabitants to the square kilometre (513 to square mile), in

Prussia 78 (202 to square mile), and in the Duchy of Mecklenburg-Strelitz only 34 (88 to square mile). In France the density of population is represented by 72 to the square kilometre (186 to square mile).

From 1871 to 1885 there have been annually for every 1000 inhabitants 8.3 marriages, 40 births, and 28.3 deaths, a yearly gain in population of 11.7 per 1000.

With respect to the relative number of male and female population, the last census gave 1039 of the latter to every 1000 males, while in France the women outnumber the men only in the proportion of 1009 to 1000, and in Russia they are in a minority of 996.7 to 1000 of the male population.

The population of France, <sup>22</sup><sub>June 18</sub> at the census of 1886 is officially stated at 38,218,903. The births during the year numbered 912,782, or 23.8 per 1000, the deaths 860,222, or 22.5 per 1000 of population, the actual excess of births over deaths amounting to 52,560, and in 1887, when there were 899,333 births and 842,797 deaths, to 56,536, or but little more than the excess of births in Scotland during 1886, when in a population of only 3,449,393 the gain by births was 54,360.

In the entire United Kingdom of Great Britain and Ireland the gain amounted to 446,649. In 1885 Germany had a surplus of 530,185 births over deaths, but the death-rate was 27 per 1000. The mean total number of births from 1871 to 1880 in France was 937,243 annually.

In Germany during the same time it was 1,771,334, or nearly double, so that, while Germany every year has one birth for every 25 inhabitants, France has only one for every 37, the marriages in both countries bearing the same proportion of 8 per 1000 population.

The actual decrease in the birth-rate of France, <sup>1085</sup> which is giving so much concern to her statisticians, has been at the rate of 12,808 annually for the seven years from 1880 to 1887, so that in respect to natality France now only holds the fifth place among civilized races. Eight per centum of the births (73,854) are illegitimate; in the Department of the Seine (Paris) the average percentage of illegitimacy is actually 25.

The total births reported in the United States during the census year 1880 were 1,577,173, of whom 806,866 were males



and 770,307 females, a proportion of 1047 males to 1000 females, a birth-rate of 31.4 per 1000 of living population, which, as in the matter of death-rate, is undoubtedly below the true figures, which Dr. Billings estimates to be 36 per 1000. For the period, 1876 to 1880, the mean annual birth-rate of England and Wales was 35.4; of the German Empire, 39.3; of Austria, 39.1, and Denmark, 31.9.

The births in Ireland last year were 112,400 and the deaths 86,585, both absolutely and in proportion to the estimated population being under the annual average of the past ten years. The excess of births over deaths was 23,815, and the loss by emigration amounted to 82,923, thus accounting for a decrease of 59,108 in the population.

It is a very melancholy fact that the average reduction of the population per year since 1887 has been close upon 40,000. The death-rate for 1887 was 18.3, which was slightly under the average rate for the previous decade. A large proportion of the deaths occurred among infants under one year old and of children under five years.

M. J. Héricourt <sup>208</sup><sub>Paris</sub> quotes from the report of Chamberland on behalf of the Commission charged with proposing laws for the organization of a public health establishment, and expresses the regret that France has not been the first to profit from the zealous labors of her sanitary statisticians. The following table represents the relative mortality per 1000 of population of France and her immediate neighbors:—

	1865.	1875.	1882, '83.	Gain in Last Seven Years.
Bavaria . . . . .	30.7	31.4	28.5	2.9
Italy . . . . .	29.8	30.7	27.4	3.3
France . . . . .	23.6	23.7	22.2	1.5
Belgium . . . . .	26.5	22.7	20.8	1.9
Switzerland . . . . .	.	24.0	20.3	3.7
England . . . . .	23.2	22.2	19.6	3.2

Now the mortality rate is greatest among infants and especially among those under one year of age, and the general mortality ought, therefore, to be greater, as the number of births is greater; but, unfortunately, M. Chamberland shows that in the matter of births France holds the lowest place among her neighbors:—

	BIRTHS PER 1000 INHABITANTS.			EXCESS OVER DEATHS.		
	1865.	1875.	1882, '83.	1865.	1875.	1882, '83.
Italy . . . . .	38.3	37.9	36.9	8.5	7.2	9.5
Bavaria . . . . .	36.9	41.6	36.2	6.2	10.2	7.7
England . . . . .	35.4	35.5	33.7	12.2	12.7	14.1
Switzerland . . . . .	35.5	35.6	32.5	..	11.6	12.2
Belgium . . . . .	31.4	32.5	30.5	6.9	10.2	9.7
France . . . . .	26.3	25.4	24.7	2.7	2.7	2.5

So that in a population of 100,000, France gives 250 a year, Bavaria 770, Italy 950, Belgium, 970, Switzerland 1220, and England 1446. France thus increases her population more slowly than any of her neighbors and her actual gain is due to the introduction of a foreign element.

How progressively the number of births has fallen behind the deaths is shown by the following summary, <sup>208</sup> <sub>Mar. 23</sub> for although in four years only, 1850 and '51 and 1870 and '71, have the births been actually less than the deaths, since 1800, and then on account of losses in war, the aggregates for decimal periods are incontrovertible evidence of retrogression :—

Period.	Aggregate Population.	Aggregate Births.	Aggregate Deaths.	Excess of Births.	Births per 1000.	Deaths per 1000.	Excess of Births per 1000.
1801-1810	284,920,467	9,180,655	7,984,646	1,196,009	32.3	28.0	3.9
1811-1820	298,047,861	9,429,186	7,731,836	1,697,350	31.6	25.8	5.8
1821-1830	315,888,500	9,741,803	7,903,733	1,838,070	31.0	25.0	6.0
1831-1840	334,184,329	9,671,940	8,280,237	1,391,703	31.0	24.9	6.1
1841-1850	350,967,165	9,578,121	8,171,611	1,406,510	27.5	23.5	4.0
1851-1860	362,064,359	9,535,933	8,667,223	868,710	26.3	23.9	2.4
1861-1870	374,903,012	9,914,866	8,893,436	1,021,430	26.3	22.9	3.4
1871-1880	368,078,686	9,349,393	8,708,768	640,625	25.5	24.2	1.3

The rate of decrease is even more marked when longer periods of time are compared :—

Periods.	Births per 1000.	Deaths per 1000.	Excess of Births over Deaths per 1000.
From 1800 to 1830 . . . .	31.6	26.4	5.2
" 1830 to 1860 . . . .	28.2	24.1	4.1
" 1860 to 1885 . . . .	25.4	23.1	2.3

The population of France in 1800 amounted to 27,349,003. Eighty-five years later it was 37,983,580, an increase of 10,634,577. The sum total of births during this interval was 80,456,370 and of deaths 69,953,146, the former being in excess only 10,503,224; consequently, when emigration and abstraction, of population by the loss of national territory are taken into account, the amount of foreign immigration and its share in the maintenance of population are readily estimated. The following official return<sup>10</sup> of the number of foreigners residing in France at various periods exhibits their progressively increasing numbers:—

Year.	Foreign Population.	Number of Foreigners to 1000 of Population.
1851 . . . . .	378,561	10.58
1861 . . . . .	497,091	13.29
1866 . . . . .	635,495	16.54
1872 . . . . .	723,507	18.40
1876 . . . . .	801,754	21.70
1881 . . . . .	1,000,000	26.70
1886 . . . . .	1,115,214	30.00
1887 . . . . .	1,215,000	

The foreign population of France has thus trebled in thirty-five and doubled in twenty-one years, and by the end of the century, with the present low rate of natality, will probably exceed two millions, and in fifty years possibly amount to one-third the entire population. At the present time there is about one foreigner to every thirty inhabitants. The influx, however, is largely of assimilable people,<sup>1066</sup> Belgians furnishing 433,000, Italians 250,000, Germans 85,000, and English only 30,000, so that, in view of the low birth-rate, their advent cannot be considered a national calamity. French demographers, however, look upon this increase with alarm, and Chamberland invites the attention of the authorities, suggesting that an indirect but sure means of antagonizing it is to lessen the mortality, so as to increase the excess of native births.

The vigorous execution of the Loi Roussel for the protection of infants of tender age has already had a satisfactory result, the deaths of children of one year of age per 1000 births now being as follows: In Bavaria, 312; Italy, 212; Switzerland, 190; Belgium, 174; France, 166; England, 152. The mortality rate of children over one year of age is—for Italy, 19.6; France, 18.1; Bavaria, 17.0; Belgium, 15.5; England, 14.5; Switzerland, 14.1.

The proportion of living children below fifteen years of age is 34 per centum in Germany and 27 per centum in France.

All causes of death taken together, it appears <sup>Oct 3</sup> that the deaths of children under one year in England and Wales have increased in eight years (1879-'86) from 135,454 in a million births to 149,215, while the mortality of children from one to five years of age has decreased from 152,821 to 139,952.

The birth-rate for 1887 of the fifty-one cities in France having an aggregate population of over six and a quarter millions was 25.9 and the death-rate 25.3, the excess of births over deaths during the year having been only 3348, whereas at the rate prevailing in English cities it should have been over 70,000, the birth-rate being 6.9 below the English rate. It exceeded 29 per 1000 in a very few towns, such as Marseilles, where it was 29.5; Lille, 32.4; Havre, 32.5, and Roubaix, 37.3, and in many towns it was actually exceeded by the death-rate, as in Bordeaux, where it was 22.4; Nantes, 21.5; Lyons, 21, and Toulouse, only 19.3.

The death-rate, 25.3, exceeded the mean rate in twenty-eight large English towns by 4.5 per 1000, and implied the deaths of more than 28,000 persons in France who would have survived in England. A further analysis of the following tables shows that the largest excess of death-rate and, by inference, the greatest sanitary deficiencies exist in the smaller French towns:—

In the ten towns, including Paris, with populations over 100,000,	the rate was	24.7
" " " " with populations from 65,000 to 100,000,	" " "	27.1
" " " " " " " 50,000 to 75,000,	" " "	25.3
" " " " " " " 40,000 to 50,000,	" " "	26.8
" " eleven " " " " 30,000 to 40,000,	" " "	26.8

The Registrar-General's "Annual Summary for London and Other Great Towns" for 1887 shows that the rate of infant mortality in London during that year was equal to 158 per 1000 of the registered births, while the rate in the aggregate of the twenty-seven large provincial towns was 176 per 1000. It further appears that the rate in these provincial towns ranged upward from 142 in Derby and 143 in Portsmouth, to 201 in Blackburn, 209 in Leicester, and 214 in Preston. While, therefore, the rate in London was considerably below the mean rate in the provincial towns, it exceeded the rate in several of those towns; indeed, the rate in seven of the towns was lower than that in London. It

appears, from a table in the Annual Summary, that the rate of infant mortality in registration London averaged 156 per 1000 in the twenty years, 1841-60, and rose to 160 per 1000 in the following twenty years, 1861-80. It is satisfactory to find that in the first seven years of the current decennium the mean rate has fallen to 152, although in the two most recent years, 1886 and 1887, the rate was 159 and 158. It is certain, however, that the decline in the rate of infant mortality in recent years has not kept pace with the decline in the death-rate at all ages, and the subject calls for more attention than it generally receives.

This excess of infant mortality is fully as much a social as a sanitary question, as it is invariably found among the most poverty-stricken sections of the population, which is housed in the most neglected and insanitary dwellings. As throwing some light upon the most effectual method of dealing with this terrible and far-reaching evil, the rate of infant mortality prevailing in the Peabody Improved Dwellings may be referred to. These dwellings have contained, during the last five years, a mean population of nearly 20,000 persons, residing, to a large extent, in the midst of districts in which very excessive rates of infant mortality prevail, and consisting, for the most part, of the poorer of the weekly wage-earning class; and yet the mean rate of infant mortality among this population did not exceed 145 per 1000, and was 8 below the general rate in the whole of London—a rate of infant mortality that far exceeds what it should and might be.

French demographers are profoundly interested in the question of the defective birth-rate of their nation, which seems to forbid the hope of ever peopling their colonies with their own race, and the matter is more serious since their vast Indo-Chinese colony has been added to their possessions. In Algeria, prior to the sanitary works recently organized, it was long feared that the low natality would imperil the future of the French occupation. Twenty-three years after the acquisition of the colony, M. Vital stated that all children born in the colony of French parents were pitilessly mowed down, and General Duvivier at one time declared <sup>55</sup> <sub>Mar. 24</sub> that the cemeteries were the only colonies that grew.

Up to 1884 the female sex alone contributed to the increase of the French population, 1026 boys dying to 1000 born, which led Bertillon to inquire what could be hoped of a race whose males

died faster than they were born. During the last two years, however, the male births have exceeded the deaths in Algeria, but in Indo-China the indications are that the only French inhabitants will soon be public officials and soldiers. The encouragement of intermarriage with other nationalities, and especially with indigenous races, has been looked to as a remedy, and René Ricoux, Chef des Travaux de la Statistique Démographique et Médicale de l'Algérie, gives a detailed statement of the number and results of such unions, which, however, are too recent and too few to afford a basis for inference.

*Excess of Females.*—While in Great Britain there are 750,000 and in Germany 988,000 more females than males,<sup>22</sup> in France the excess of the former is only 92,000, and in Russia they are 175,311 in the minority. One hundred and five French boys are born for every 100 girls, but this is more than counterbalanced by the greater male death-rate of 107 to 100. Of the million annually born in the proportion of 20 boys to 19 girls, only 555,000 survive by the end of the twenty-fifth year, and at the end of the seventy-fifth only 25,000, the women being then in the proportion of 7 to every 6 men.

It is a curious fact that in Japan<sup>200</sup> the marriageable males between the ages of 14 and 26 are several thousands in excess of the females between the same ages. Up to fifty the ratio increases between the sexes, after which it is reversed, and from fifty-eight to seventy there is an excess of more than 10,000 females over males. The annual birth-rate of males is greatest, but is counterbalanced by their greater death-rate.

*Number of Children to a Family.*—In 1887 the average number of children to a family was, in France 3.2, in Prussia 4.14, in England and Wales 4.6, in Scotland 5.25, and in Ireland 5.45. The fact that while the birth-rate in Ireland is only 23.2 per 1000 there is the largest number of children to the family is accounted for by the Registrar-General of Ireland by the actual emigration of so many persons of the productive ages. At the beginning of the century French families averaged 4.14, but in 1887 Lagneau reports the actual number of legitimate children born to a marriage as only 2.97. One hundred French women under fifty years of age furnish only 16 children, or but one birth to every six households. According to M. Chervin,<sup>2</sup> among 100

married couples in France, 24 will have no children, 24 will have one child, 22 will have two children, 15 will have three, 9 will have four, 5 will have five, 3 will have six, and 2 will have seven or more, or an average of 259 children to 100 fertile marriages.

*Extinction of Families.*—Bertillon's distinguished successor as a statistician, M. Gustave Lagneau, in a "Demographic Study of the Diminution or Increase of Families,"<sup>1088</sup> read before the Académie de Médecine, stated that all aristocracies and close bodies of men have gradually lost in number, and would have become extremely reduced without occasional mixture with new blood. Between 1583 and 1654 the Sovereign Council of the city of Berne admitted 487 families to citizenship. In 1783 only 108 of these families had escaped extinction. Out of 458 baronets created by James I and Charles I between 1611 and 1648, only 107 of their titled representatives remained in 1731. In 1840 only 8 out of 80 noble families existing in 1400 had escaped extinction. M. Benoiston de Chateauneuf, after scrutinizing the pedigree of 380 noble French families, found that their average duration was 300 years. The great burgher families of the Hanseatic towns, Holland and Venice, disappeared rapidly; not one of the original patrician families of Zealand is now in existence. Laine, carefully examining thirty-one charters of cities in Languedoc, Burgundy, Lorraine, and Brittany, granted at the end of the twelfth century, authenticated 314 noble families only represented in 1840 by 12 survivors. Among the poor the extinction of small tenant families appears almost as rapid. Out of 127 families, numbering 800 souls, existing in the commune of Marigny-en-Orxois, now in the Department of the Aisne, in 1555, only 14 appeared to be in existence in 1836, so that the families of workmen decrease like those of the noble and bourgeois classes. The struggle for existence in Anglo-Saxon communities must have the same effect.

M. Lagneau<sup>3 Oct. 10</sup> estimates that of 100 families having 300 children, that is, 3 children to a family (the actual proportion of legitimate natality in France being 297), at the fifth generation, after 124 years, more than half have no male lines of descent, only 49 males then contracting marriage. By the seventh generation, after 186 years, about two-thirds of these 100 families have no male descent, only 34 males contracting marriage. At the ninth generation, after 248 years, the male descendants transmitting the

paternal name represent only one-fourth, that is, 25 of the 100 primitive families. At the fifteenth generation, after 434 years, nine-tenths of the original hundred families will have no males left to continue them.

Dr. Elcanor Lawney, of Denver, Colorado,<sup>119</sup> in a paper read before the Medical Jurisprudence Society, attributes the persistence of female births to the degeneracy of the stock, which ceases to be able to produce males, and further explains the production of unfruitful women as the last expression of generative force in a decaying stock. Professor Chaillé<sup>12</sup> claims that nature has endowed the female with a stronger vitality and with greater vital endurance, for while adult males are ordinarily more numerous and more subjected to vicious and hurtful excesses, out-door exposure, and hazardous occupation, and therefore exhibit greater mortality than females, it is a fact that the superiority of females is at no time as great as under five years of age, when the conditions of life of the two sexes are the same.

*Longevity.*—It has been said,<sup>59</sup> that the happiest nation is that in which the proportion of men and women is most nearly equal, in which the number of illegitimate births is least, which contains the greatest number of healthy adults, in which the average life is longest, and in which the proportion of people over sixty years is highest; and, according to the *Paris Temps*, France is the country in which these conditions are most fully met. It undoubtedly possesses<sup>22</sup> the greatest number of persons of the effective ages from fifteen to sixty. Thus, among each 10,000 inhabitants France has 5,373 between these ages; Holland, 4964; Sweden, 4954; Great Britain, 4732, and the United States, 4396. According to Bertillon, among every 1,000 inhabitants those over sixty number, in France, 108; in Bavaria, 94.8; in Switzerland, 90.2; in Belgium, 88; in Italy, 82; in Sweden, 80; in Holland, 80; in Paris, 74.7; in England, 73; in Prussia, 70; in Saxony, 69; in Spain, 62, and in Hungary, 48.5.

The average age of all the living is, in France, 31.06 years; in Holland, 27.76; in Sweden, 27.76; in Great Britain, 26.25, and in the United States, 23.21. As a greater proportion attain old age in France than in other European countries, they are correspondingly in excess among the deaths. Among every 100 dead,<sup>2</sup> those over sixty years of age are, in France, 36; in Switzerland, 34; in England,



30; in Belgium, 28; in Wirtemberg, 28; in Prussia, 19, and in Austria, 17.

The statistical report just published from the Prefecture of the Seine shows,<sup>108</sup> that among the 2,260,945 constituting the population of Paris, 6,386 are above eighty years of age, 2,747 between eighty-five and eighty-nine, 640 past ninety, 138 more than ninety-five, and 20 veritable centenarians, including four bachelors, one married man, six widowers, one spinster, one wife, and seven widows.

Levasseur<sup>208</sup> presented an interesting paper to the Académie des Sciences Morales et Politiques at its session, July 7th, on statistics relating to centenarians, in which he alluded to the disposition on the part of very old people to exaggerate their ages through vanity, actual forgetfulness, ignorance, or love of notoriety, as well as to the gradual additions which instances of reputed longevity receive in the public prints. The first official attempt to verify the ages of alleged centenarians was made in Bavaria in 1871, when it was discovered that only one among thirty-seven such had really passed the hundredth year. A similar inquiry was made about the same time in Canada, which was noted for the number of its centenarians, and out of 421 persons reported to be of this age, the facts concerning only 82 could be ascertained, and among these only 9 were able to establish after a fashion their claim to the title. The Bureau de la Statistique Générale de France has undertaken the same task in that country. Among 184 reported as centenarians, satisfactory evidence of the fact was only obtained in 83 instances. Of the other 101, false statements were made in 53 instances, as a joke in 4 cases, and as exaggerations in 49, and in 48 no precise information was obtainable.

The sex and civil status of the 83 indisputable centenarians are as follow:—

	Males.	Females.	Total.
Single, . . . . .	6	10	16
Married, . . . . .	2	1	3
Widowers or widows, . . . . .	23	41	64
Aggregate, . . . . .	31	52	83

The women are thus largely in the majority, and it is a matter of note that the most of them are indigent, a fact likewise referred to by the Registrar-General of London in his thirty-eighth report, that among 87 English centenarians (27 men and 65 women)

12 had died in the workhouse or almshouse and the immense majority were in want or working for their support. As the average number of deaths of centenarians in France during the past twenty years has been 73 (27 men and 46 women), this number may be assumed to be also the average number living, otherwise they would either soon diminish rapidly in number or as rapidly increase. There were 380 centenarians<sup>40</sup> in Italy in 1887, of whom 247 were women and 133 men, and Professor Cexis found 39.6 among 1000 persons of both sexes who had reached or passed their seventieth year. The native medical journal of Japan, the *Sei-i-Kwai*,<sup>60</sup> enables comparison to be made with that race as to longevity. The population of Japan, according to the census of 1887, was 38,507,177, of which number 1,086,001 were between 70 and 80 years of age, 247,055 between 80 and 90, 12,200 between 90 and 100, and 97 were 100 (24 men and 73 women), the oldest two being women respectively 109 and 111 years of age.

The French are the most industrious demographers of the day. M. Clément's statistical history of Lyons and M. Mircur's of Marseilles leave little untouched, and are commendable models for systematic research in other large cities. Brief abstracts from each may be of interest.

*Lyons.*—According to M. Clément<sup>211</sup> the birth-rate of this city for the twenty-five years ended in 1885 has been:—

Periods.	Aggregate Population.	Aggregate of Living Births.	Aggregate of Still-Births.	Total Births.	Living Births per 1000.	Total Births per 1000.
1861-1865	1,602,315	45,069	3,563	48,622	28.1	30.3
1866-1869	1,295,816	33,785	2,669	36,454	26.1	28.0
1870-1871	647,908	15,875	1,328	17,203	24.1	26.5
1872-1874	993,525	26,767	2,357	29,124	26.9	29.3
1875-1880	2,113,168	51,991	4,154	56,145	24.6	26.5
1881-1885	1,922,565	45,653	3,756	49,409	23.7	24.8
25 years.	8,575,297	219,140	17,827	236,967	25.5	27.7

M. Clément discusses elaborately the fecundity of the Lyonnese women, and finds that among the 156,498 nubile women over 15 years of age constituting 40 per centum of the entire population of the city (1881-85), 384,513, the living births per 1000 were 58, a feeble natality compared with that of the whole Department of Bouches du Rhône, 70; the Seine, 78.5, and France, 72.7; or, con-

sidering only women of the procreative period, fifteen to fifty years of age, the average living births per 1000 for Lyons are 75, the Rhône, 93; the Seine, 100, and France, 102. Among 1000 unmarried women at Lyons there is an average of 26.22 natural births.

The illegitimate births, which in 1861-65 were in the proportion of 7 per 1000 inhabitants to 21 per 1000 legitimate, during the period 1880-85 numbered only 5 per 1000 to 19.35 per 1000 legitimate, the rate of decrease in both instances having been the same. The death-rates for Lyons during the past thirty years have been as follow:—

Periods.	Mean Population.	Mean Annual Deaths.	Mortality per 1000 of Living Population.
From 1855-1860	311,922	8,270	26.51
" 1861-1869	318,803	8,388	26.31
" 1870-1871	318,803	11,682	36.64
" 1872-1874	331,175	8,991	27.16
" 1875-1880	352,194	9,336	26.51
" 1872-1886	362,012	9,209	25.44
" 1881-1886	387,416	9,192	26.73
1886	401,930	9,234	22.97

The diminution of mortality indicates the saving during the past five years of 5586 existences, or an annual number of over 1100 individuals saved from death.

*Marseilles.*—Dr. H. Mircur <sup>46</sup><sub>Aug-Oct</sub> gives as the aggregate number of births in this city during the twenty years between 1866 and 1886, 196,833, and of deaths, 199,182, an actual excess of deaths of 2349, so that but for foreign immigration the population of Marseilles to-day would have been less than it was in 1866. Its actual increase has been from 300,131 in 1866 to 375,378 in 1886, in all 77,596, of which 75,247, consequently, represents the amount of influx of strangers. The following table allows comparison of quinquennial periods:—

Periods.	Births.	Deaths.	Excess of Births Over Deaths.	Excess of Deaths Over Births.	Birth-rate per 1000.	Death-rate per 1000.
From 1866 to 1871 . . .	48,944	44,834	4,110		32.0	29.4
" 1871 to 1876 . . .	46,491	47,550		1,059	29.6	30.2
" 1876 to 1881 . . .	48,539	50,052		1,513	29.0	29.8
" 1881 to 1886 . . .	52,859	56,746		3,887	28.8	31.0
Total . . . . .	196,833	199,182	4,110	6,459		

The birth-rate has thus fallen from 33.3 per 1000 in 1866, when it was 3.9 in excess of the death-rate, to 29 per 1000 twenty years later, when it was 2.2 less than the death-rate, a regrettable fact, in variance with the experience of most of the cities of the world.

The relative share of the sexes in this retrogression is here illustrated:—

PERIODS.	MALES.				FEMALES.			
	Births.	Deaths.	Excess of Births Over Deaths.	Excess of Deaths Over Births.	Births.	Deaths.	Excess of Births Over Deaths.	Excess of Deaths Over Births.
From 1866 to 1871 . . .	24,534	23,367	1,167		24,410	21,467	2,943	
“ 1871 to 1876 . . .	23,580	25,282		1,702	22,911	22,268	643	
“ 1876 to 1881 . . .	24,851	26,473		1,622	23,688	23,579	109	
“ 1881 to 1886 . . .	26,815	30,192		3,397	26,044	26,564		580
Total . . . . .	99,780	105,314	1,167	6,631	97,053	93,868	3,695	580
Aggregate Excess of Deaths . . . . .				5,464			3,115	

The female sex, therefore, maintained its excess of birth-rate until 1881, since which date it has likewise retrograded.

The death-rate for Marseilles has risen from 29.4 in 1866 to over 31 in 1886, being, therefore, at both periods, much below the general rate for France, which was 24 in 1866 and between 22 and 23 in 1886. Hence, while the duration of life in France exceeds 36 years, in Marseilles it scarcely reaches 31.

The medical officers of the French military and naval services are as indefatigable as their civilian compatriots in accumulating materials for a complete system of vital statistics of France and her colonies. Grandmongin<sup>243</sup><sub>Feb., Mar.</sub> has thoroughly studied and reported the medical history of Belfort on the eastern frontier, and Aubert<sup>10</sup><sub>Feb. 14</sub> that of the Department de l'Ain. Marestang, of the French Navy,<sup>195</sup><sub>Mar.</sub> contributes an interesting demographic account of the Island of Saint Bartholomew, which, after nearly a century's allegiance to Sweden (1784–1878), passed by treaty in the latter year into the hands of the French, who thus for the fifth time

became its owners. The population in 1883 amounted to 2555 persons, 1072 males and 1483 females. Settled by Normans in 1648, intermarriage has resulted in preserving the Norman accent, customs, character, and forms of speech. The same names appear on the registers of births, deaths, and marriages as in 1770. Selecting 17 Norman names, forming 235 families and comprising 1465 individuals, exempt from admixture, M. Marestang made them the subjects of his special investigation.

During the eight years since the retrocession (1879-1886 inclusive) there had been 123 marriages and 612 births—five to each marriage—and among the selected Norman families 100 marriages and 442 births, or 4.42 to each marriage. Among 50 families taken indiscriminately among the nearest hamlets to Gustavia, the capital, he found 249 children (124 boys, 125 girls), giving as the average number of children to a family 4.98, and, assuming an aggregate total duration of 786 years for these 50 unions, an average of one child every 38 months of the genital life of the parents.

The mortality of the whole island for the eight years was 404, an annual mean of 50.5, or 19.76 per 1000 for the whole population. The deaths in the selected Norman group of 235 families was 210, or 26.25 per year, or at the rate of 17.91 per 1000, and therefore below the rate for the whole island, which included both whites and blacks. Among the 50 special families in which there had been 249 births, there had been 32 deaths—23 during the first year (923 per 1000) and 9 during the second year (361 per 1000), giving a mean infant mortality of 128.5 per 1000.

Among 61 marriages there was only one case of absolute sterility. One of the parties in a second sterile marriage had had children in a former union. Abortions were almost unknown—only occurring as accidents in early parturitions—and generally unattended with trouble of any kind.

Among the 1465 descendants of Normans in St. Bartholomew, 116 were individuals over 60 years of age—that is, 79.17 per 1000, and 699 were less than 20 years old—or 476 per 1000.

According to Arnould a race is acclimated when it maintains (1) its force of demographic expansion, (2) its normal longevity, (3) its aptitude for physical and intellectual labor. All three of these conditions have been realized by the white population of St. Bartholomew.

*Brussels.*—Dr. E. Janssens, Inspecteur en Chef du Service d'Hygiène of the city of Brussels, in a report on the Statistique Démographique et Médicale of the city of Brussels for the year 1887, states that on the 1st of January of that year the population numbered 177,568, of which 83,455 were males and 94,113 females—or 1000 males to 1127 females.

The number of births amounted to 5192, classified as follows:—

	Legitimate.	Illegitimate.	Total.
Males, . . . . .	1918	756	2674
Females, . . . . .	1825	693	2518
Aggregate, . . . . .	3743	1449	5192

The birth-rate was, therefore, 29.2 per 1000 of population, of which nearly 28 per centum were illegitimate, and 1061 boys are annually born to 1000 girls.

The number of deaths amounted to 4183, of which 2261 were of males and 1922 of females. The death-rate was, consequently, 23.5 per 1000 of living population, 1176 males dying to every 1000 females.

*Argentine Republic.*—M. L. Baret, <sup>208</sup><sub>Mar. 24</sub> in an article on the demography of European settlers in the Argentine Republic, claims that the progress of North America, and especially of the United States, has diverted attention from the wonderful development of the southern extremity of the American continent, the Argentine Confederation particularly. This still adolescent country, formed by the federation of the United Provinces of the Rio de la Plata, occupies almost the entire southern part of South America, between latitude 20° and 52°, comprising an area of 4,195,520 square kilometres (1,619,471 square miles), divided into fourteen provinces and four territories. The province of Santa Fé, comprising 25,000 square kilometres (13,650 square miles) of territory, situated in the very centre of the Republic, has been the favorite seat of European immigration, which has established itself in “colonies” or agricultural centres. In 1885 there were 98 such colonies; in 1886, 122, the population that year amounting to 110,000, or 20,883 more than the total population of the territory in 1869.

Of 605,583 European settlers who have emigrated to the Argentine Republic since 1870, the ratio of adult males of the

several nationalities has been, Italians 445 per 1000, Spaniards 107, and French 74. The rapid growth of the colonies shows that the neo-Latin races are as apt at colonizing as the Anglo-Saxon or Germanic.

*The Negro Race.*—Southern writers are generally of opinion that emancipation has only accelerated the physical degeneration of the American negro. It is believed that the next census<sup>24</sup><sub>Feb.</sub> will show a diminution in the hitherto rapid birth-rate and an increase in the death-rate, which is everywhere greatly above that of the whites. Dr. E. B. Corson, of Savannah,<sup>61</sup><sub>Mar. 10</sub> reviewing the causes which are leading to the extinction of the negro, says that while slaves they were regular in diet, dress, exercise, and all their habits of living; they are now flocking to the cities, where their living is necessarily of the poorest character. Education simply causes them to despise and neglect such employment as they can get. Before the war they were much less susceptible to malarial diseases than the whites and enjoyed almost immunity from yellow fever. Recent experiences show they are liable to both, and that enteric fever, dysentery, syphilis, and consumption are increasingly fatal diseases among them. Thirty years ago phthisis in the pure black was almost unseen in medical practice. The negro, having lost the protective care of his master, suffers in greater degree from the few diseases which used to be his enemies and falls a victim to many to which he was then a stranger. The mulatto is even worse off, for he has lost the immunity to certain diseases enjoyed by his fathers of pure African blood, while he has acquired<sup>59</sup><sub>Mar. 10</sub> none of the robustness belonging to the Anglo-Saxon. Dr. J. W. Byers, of North Carolina,<sup>19</sup><sub>June</sub> says: "Any race of people which can, in so short a space of time that has been allotted to it as freemen, double both its mortality and criminal rates—and the negro race has done this—is inevitably doomed to destruction. The average increase for the white race during the last three decades is about 50 per centum, while that of the negro has scarcely been 20. Of the entire criminal class of the country the negro now forms nearly 25 per centum, and Dr. Andrews, of Buffalo, has said that insanity has increased among them (1870 to 1880) at the rate of 26 per centum. Professor Chaillé says the death-rate of children under five years of age is regarded by sanitarians as a most sensitive and reliable test of the sanitary

conditions of a people. In New Orleans this amounts to 71 per 1000 for the whites and 130 per 1000 for the blacks. In cities enumerated in the last United States census, St. Paul exhibited the lowest death-rate at this age (31), and the negro children of Charleston, South Carolina, the highest (205). Deaths from childbirth (3.57 per 1000) were twice as great among negro women as among whites. The negro female has a greater virulence and, consequently, greater expectation of life than the male.

*The American Indians.*—Dr. A. D. Lake, <sup>80</sup>for many years resident physician to the New York Indian Agency, calls attention to the physical, mental, and moral retrogression of the Indians of the Cattaraugus Reservation. He says the first point to attract attention is the imperfect, poorly developed physique of the children and their immediate progenitors, the males especially. Instead of the full-chested, robust form and erect figure of the uncivilized Indian of a few generations ago, we see his emaciated, sallow, stooping, degenerated successors of to-day. They are observed to become quickly fatigued at their games and dances. The vaunted stoicism which enabled the savage aborigine to bear without a murmur the agony of burning at a stake has given place in his civilized descendant to such a spirit of fear and cowardice that the opening of a small abscess or drawing of a tooth elicits groans he does not seek to stifle. Tubercular disease and syphilis, with the negro, are the two potent factors in the Indian's physical degeneracy.

*South Africa.*—Dr. Charles F. K. Murray, in his inaugural address <sup>81</sup>to the South African Medical Association, alludes to the necessity for protecting the growing population of the South African colonies from the uncontrolled invasion of such preventable diseases as leprosy, syphilis, and alcoholism. Experience in other countries has shown that segregation is the solution of the first, and that association of criminal classes in ill-contrived and badly-cared-for jails is responsible for the spread both of leprosy and syphilis. So large a portion of the lower classes is infected with syphilis that nurses and domestics drawn from these classes communicate it to children—one of the favorite procedures of negro nurses being to masticate and insalivate food before giving to their charges.



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[illegible]

of sanitary condition, but in all collective investigations of single diseases one source of error unfortunately exists, to wit: the want of agreement and uniformity of nomenclature, especially in case of fevers. A considerable proportion of cases of enteric fever are undoubtedly recorded simply as "fever," or "malarial fever," as during yellow-fever epidemics unmistakable cases of yellow-fever infection appear as headaches, intermittents, remittents, and the like.

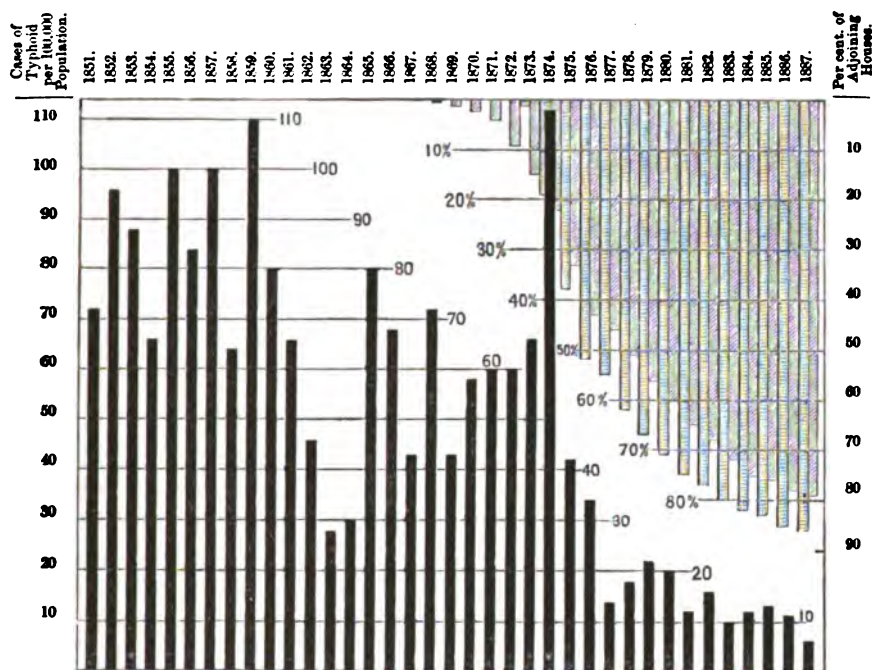
According to Bertillon,<sup>208</sup> the deaths from enteric fever in some of the principal European cities during the year 1885 were, in Marseilles, 149; Toulouse, 79; Turin, 68; Paris, 63; Rome, 44; Lyons, 42; Edinburgh, 34; Basle, 33; Liege, 32; Hamburg, 32; Liverpool, 31; Geneva, 29; Zurich, 28; Glasgow, 25; Brussels, 19; Munich, 18; Berlin, 17; London, 17; Dresden, 15.

Returns from fifty French cities give a mortality rate from this disease of .69 per 1000 of living population. In twenty-eight English towns during the same period the mean death-rate from all continued fevers was only .22. The highest individual rate was in Angoulême, 3.84. It has been estimated<sup>6</sup><sub>Apr. 21</sub> that such a death-rate signifies at least 24 cases of attack per 1000 of population, and it must be borne in mind that comparatively few cases occur among children or elderly persons, so that probably 5 per centum of the younger adult population of towns like Havre and Angoulême were attacked by this disease, which suggests the importance of accurate morbidity statistics, especially in the case of preventable diseases.

At the fourteenth annual session of the Congress of the German Society of Hygiene and Public Medicine, held at Frankfort-on-the-Maine,<sup>208</sup><sub>Oct. 6</sub> attention was called to the marked diminution in the rate of mortality from enteric fever since the establishment of the system of sewerage and the introduction of spring-water. In 1881 the deaths from enteric fever per 1000 of population numbered .20,9; from 1881 to 1885 the mortality fell to .12,2; in 1886 it was .11,5, and in 1887, .06,3. The following graphic illustration shows the diminution of mortality *pari passu* with the progress of the system of underground sewerage and the extension of the supply of pure water.

According to the Tenth Census, the deaths from enteric fever in the United States amounted to 30.49 per 1000 of deaths from

all causes. The greater number occurred among persons from five to forty years of age, the mean age at death being twenty-seven years. One fact is notable<sup>15</sup>: "In the fifty large cities enteric fever is reported as causing 16.7 in each 1000 deaths from specified causes, while in the rest of the country it caused 36 per 1000; and this is taken as indicating that it is not a disease of sewered cities having a general water supply to such an extent as it is of those places where wells and privies are chiefly used."



GRAPHIC REPRESENTATION OF DIMINISHED DEATH-RATE FROM ENTERIC FEVER AT FRANKFORT *pari passu* WITH EXTENSION OF UNDERGROUND SEWAGE AND SUPPLY OF PURE WATER.

Black columns, cases of typhoid fever per 100,000 population; cross-hatched columns, sewerage; dotted columns, water supply.

**Cancer.**—Alfred Haviland, at the close of an article on the geographical distribution of cancerous diseases in the British Isles,<sup>6</sup> states that the highest mortality in England and Wales was associated with the principal river systems in these countries. In Scotland it is a matter of note that with one exception, the Clyde, all the rivers are to be found on the eastern side, and on examination of the mortality map it will be seen that all the counties on the eastern side of Scotland, which are either traversed

or bordered by fully formed rivers, indicate a high mortality from cancer without exception. Quoting a former paper published in 1869, "phthisis was shown to have a geographical distribution almost the reverse of cancer. The *plus* average or *blue* group of the Herefordshire cancer field, in the *phthisis* map, had the *minus* average or *red* color; the *plus* average of *blue* color of the Thames cancer field was *red* in the *phthisis* map, and the *red* or *minus* average districts of the northwest of England and Wales were colored *blue*, indicative of high mortality. Again, the great south-eastern *red* group of low mortality in cancer, which *surrounded* the Thames field (the water-parting districts on oölite and chalk), had its districts colored *blue* in the *phthisis* map."

Dr. Stark, late Registrar-General of Scotland, published in 1874 a set of tables indicating the same inverse relation between cancer and phthisis.

In Scotland there are no wide stretches of easily soluble calcareous rocks, such as chalk, oölite, and mountain limestone. The silurian and other rocks that assist in reducing the death-rate from cancer do so more by their physical than their chemical characteristics.

Mr. Haviland concludes that "there is abundant evidence there to show that cancer does not thrive in high, dry localities, where the soil is kept sweet by the absence of floods and the nature of the rocks which either underlie it or form its principal constituents; and that it does thrive and become very fatal where floods prevail, where their emanations are sheltered and intensified, where vegetation is killed and decomposed, and where, after the floods have passed away, a rank herbage springs up, composed of sour grass and bitter plants, which scour and otherwise disease the horses, cattle, and sheep that feed upon them. Much has to be done, much has been pointed out, and if the twenty-two high mortality and the sixteen low mortality districts were well studied in connection with the various factors which we have seen to be coincident with high or low death-rates, I believe that much would be added, much would be corrected, and much revealed that we little think of now."

Advantage was taken by Mr. Haviland of an excursion at the Fifth International Geological Congress at London to the chalk deposits exposed at Erith and Crayford to show the coin-

cidence of the thrift of certain flowering chalk plants in calcareous localities in which cancer cannot or at least does not appear, and he suggested<sup>22</sup> the desirability of collecting facts from all parts of the world on the subject of medical climatology and disease distribution.

H. P. Walcott,<sup>61</sup> notes the fact that the progressive increase in the death-rate from cancer in England and Wales from 2.7 per 10,000 in 1847 to 5.3 per 10,000 in 1882 is almost precisely paralleled in the State of Massachusetts, where the death-rate from this disease has risen from 2.9 per 10,000 in 1867 to 5.6 in 1886, or nearly double, the ratio of fatal cases among females having advanced from 64.4 in 1881 to 69.7 in 1886.

Sir Spencer Wells states,<sup>6</sup> that the increase in mortality from cancer in England during the twenty-six years, 1861-87, was from 3.6 per 10,000 to 6.06; in Ireland the annual average rate from 1864-80 was 6.76, and from 1881-87 it was 8.73 per 10,000; and in Scotland the proportion of deaths from cancer was greater than in Ireland—an increase far more than can be attributed to improved registration—whence the necessity for more detailed statistical returns.

*Cholera Infantum.*—Dr. H. Seibert,<sup>9</sup> presented a paper to the New York Academy of Medicine on the causative relation of the weather to acute gastro-intestinal catarrh in children under five years of age, having tabulated 8,036 cases treated at the German Dispensary between January 1, 1878 and January 1, 1888, in which he shows that in the ten Julys there were 2443 cases, and in the ten Augusts 1524, while in the ten Februarys there were only 117, but that it was not the case that the disease was most prevalent or fatal on the specifically hottest days or periods. Dr. Seibert also found that the number of cases and of deaths bore no relation whatever to the rise and fall of temperature, range of humidity, light and heavy rainfall, velocity of air currents, etc., but careful examination of the details of individual cases led him to the following conclusions: (1) *hot* weather, either dry or moist, is not necessary for the epidemic appearance of acute gastro-intestinal catarrh; (2) *warm* weather, either dry or moist, showing a minimum daily temperature of not less than 60° F., brings the epidemic every year irrespective of the maximum daily temperature; (3) the disease loses its especial characters as soon as the

minimum daily temperature falls below 60° F., as in October; (4) therefore, this disease cannot be brought about by the direct effects of high temperature on the child's body. Coincidence was noted of the facts stated by Dr. Edson, Health Officer of New York, that milk brought into the city began to spoil, and by the Chief Engineer of the Water Department that the water supply was also affected by decomposition when the temperature reached 60 F°.

*Effects of Climate.*—Dr. Louis Catat, of the French Navy, in a recent thesis <sup>217</sup><sub>July</sub>, on the effects of polar cold on the human organism, says that the inhabitants of the Frigid Zone, notwithstanding their diversity of origin, have come to present, as the result of the influence of their climatic surroundings, common traits distinctively characteristic of a boreal race, and his paper analyses the physiological and pathological changes in the several apparatus as the effect of great cold.

D. H. Cullimore <sup>22</sup><sub>Oct. 21</sub> discusses with equal thoroughness the subject of the effects of tropical and sub-tropical climates and the acclimatization of the fair races in hot countries, and Surgeon G. H. Younge, of the Army Medical Staff, <sup>206</sup><sub>Dec. 1</sub> enters at length into the study of hepatic exhaustion and its influences on health in the tropics.

Dr. E. F. Plà, of Havana, Cuba, corresponding editor, favors me with a brief note inclosing the following statistical report of deaths from yellow fever at Havana during the first eight months of the current year:—

MONTHS.	MILITARY HOSPITAL.			Deaths from Yellow Fever among the Civil Population.	Total Deaths from Yellow Fever.	Total Number of Deaths in Havana.	Deaths from Yellow Fever per 1000 of Deaths from All Causes.
	Total Deaths.	Deaths from other Diseases.	Deaths from Yellow Fever.				
January . . .	14	9	5	4	9	766	11.75
February . . .	9	4	5	3	8	592	13.51
March . . . .	16	5	11	3	14	564	24.82
April . . . . .	28	7	21	2	23	467	49.25
May . . . . .	25	4	21	5	26	410	63.41
June . . . . .	33	6	27	10	57	490	116.32
July . . . . .	61	3	58	28	86	590	145.76
August . . . .	65	3	62	52	114	630	180.95
Total . . . .	251	41	210	107	317	4509	70.30

*Medical Nomenclature.*—The facts of disease, however extensively and carefully garnered, cannot be made available for exact morbidity and mortality rates until a definite system of nomenclature shall have been established, and, as was well said by Alfred L. Carroll,<sup>61</sup> in introducing a discussion on Nosography before the New York State Medical Association, until our knowledge of pathology shall be complete, an ever-diminishing portion of any system of classification must, of necessity, be provisional, and there will remain an excuse for the symptomatic naming of unknown pathic conditions, such as “myxœdema,” “progressive muscular atrophy,” “glycosuria,” etc.

Insistence upon absolute etymological correctness would deprive us of most of our nosological titles; consequently, when an artificially assumed meaning of a current word has become generally accepted and is clearly defined, its retention in any branch of science is permissible. Such names as *ranula* (a little frog), *lupus* (a wolf), *cancer* (a crab), *scrofula* (pertaining to a sow), *sycosis* (fig-like), *carbuncle* (a little Latin coal), and *anthrax* (a great Greek one), are ridiculous enough; but “*rachitis*,” as manifested in long bones, “*rheumatism*,” implying a watery discharge, “*hysteria*,” as occurring in the male, and “*gonorrhœa*” in the female, are equally absurd, and while, possibly, pardonable cloaks for ignorance in the past, have no apology for their existence in the light of later research. The modern tendency to apply personal designations to diseases or single symptoms is only adding worse confusion to medical nomenclature. It is only necessary to instance, as evidences of this growing evil, such designations as Parkinson’s disease, Duchenne’s palsy, Basedow’s disease, Weil’s disease, Friedreich’s disease, Bright’s disease, Heberden’s rheumatism, and the *one hundred and four* others, of which a list<sup>152</sup><sub>Oct. 16</sub> has been published.

What Dr. Gouley<sup>1</sup><sub>Dec. 2</sub> said in a discussion on the renaming of tumors is pertinent here with respect to the general subject of medical nomenclature: “The old saying, that the profession is not yet ripe for a philosophical nomenclature and classification of disease is still often reiterated by those who lose sight of the fact that the endeavor to properly name and systematically arrange morbid conditions leads to the most direct path toward the right understanding of their nature. To attempt to make an entirely

new arrangement would not be wise; to strive to improve that which is at hand is practicable and practical."



## HYGIENE AND EPIDEMIOLOGY.

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WASHINGTON.

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### HYGIENE.

#### GENERAL CONSIDERATIONS.

AMONG many efforts made during the year to show the general effect of hygienic study and practice on mortality, that of Ernst Almquist<sup>58</sup> deserves particular mention. This author limited his researches to the effect of the most ordinary hygienic measures of a city upon its mortality. The following figures give the rate of mortality for Göteborg, where the water supply and sewerage systems were completed soon after 1870:—

#### ANNUAL MORTALITY PER 1000.

1866-70 (prior to improvements)	28
1871-75	24
1876-80	20
1881-85	20

These figures show that the mortality was lessened immediately after the completion of the hygienic improvements, and the results agree with corresponding investigations in other cities. Unfortunately, other causes of the fall of mortality cannot be excluded; as, for instance, the absence of epidemics of cholera, typhus exanthematicus, variola, scarlatina maligna, etc., which previous to 1870 extended over Europe. Almquist recommends for the exact solution of this question: (1) investigation of the annual mortality of the same city during an extended period (110 years) under different hygienic conditions and epidemic periods; (2) search for possible changes in the appearance of epidemics; (3) determining whether certain diseases, recurring year by year, have been lessened within the last twenty-five years.

He next presents a table of the annual mortality in Göteborg since 1776, with annually occurring epidemics. He discusses this table *in extenso* under the following heads: (1) Statistical Material; (2) Sanitary Improvements; (3) Decreasing Mortality; (4) Studies of Years Free from Epidemics; (5) The Behavior of

Epidemics Formerly and at Present; (6) The Diseases Appearing Every Year. The following are his conclusions:—

1. The mortality has greatly decreased since last century, and has also fallen from time to time in the present century, before hygienic measures were undertaken. This decrease is, therefore, to be ascribed to the more favorable conditions of the people as to political, social, and economic surroundings.

2. From the fact that certain periods have been visited by different kinds of malignant epidemics while others have been remarkably free from them, and that in former times certain periods of high mortality have occurred while others show a lower mortality during a number of consecutive years, it is evident that the influence of certain sanitary works cannot be proven with certainty by a comparison of mortality for a few years before or after the time they were put in operation. It is equally faulty, simply upon the basis of observations of the general mortality of a city during a short period, to designate its condition of health as bad. Before all, we should be cautious in comparing the mortality in epidemic and non-epidemic years in that respect.

3. The present low mortality of Göteborg cannot be ascribed mainly to the hygienic improvements, because periods of low mortality, some continuing as long as ten years, can be found in former periods when no sanitary measures were in operation.

4. In Göteborg the significance of these hygienic works for the general mortality of the city during non-epidemic years can hardly be rated as higher than from twenty-five to twenty per thousand.

5. It is proven that something can be done against the spread of epidemics, even not considering vaccination; but the non-appearance of late of diseases such as dysentery, cholera, intermittent fever, variola, and typhus does not justify the conclusion that they were dissipated by hygienic measures, since in former times there were periods of considerable length during which one or another of these epidemics failed to appear. The effect upon epidemics of the hygienic works in Europe at the present time cannot as yet be determined, and possibly can only be seen with certainty when cities conducted under sanitary conditions remain free from epidemics which invade cities not so conducted; or when an epidemic has assumed a strikingly changed

character in a country for an extended period, while other exciting causes can at the same time be excluded.

6. Among the diseases appearing annually in Göteborg, the following have shown no inclination to decrease during the last twenty-five years: phthisis, pneumonia, pulmonary catarrh, nephritis, cancer, *et al.* Puerperal fever and traumatic infectious diseases have greatly decreased. Infantile diarrhoea presents, perhaps, a slightly lessened mortality; typhoid fever, *per contra*, has greatly decreased.

Dr. Pietra Santa, our corresp. ed., sends an interesting report from France, upon the proposed establishment of the service of public hygiene in that country, a regular and permanent organization having for its object the study of sanitary questions.

There were created for this purpose :—

(a) A central council of hygiene and salubrity at the capital of the department; (b) a ward council of hygiene at the headquarters of the sous-préfecture; (c) district commissions of hygiene established in the chief district towns; (d) a superior consulting committee established in Paris, at the head of the organization.

In the first rank of duties for these councils were :—

1. The examination of all questions relative to public hygiene. 2. The sanitation of localities and houses.

Instead of engaging in this simple and logical path of reform, the government on the one hand, and parliamentary enterprise on the other, have undertaken to overturn all that was proposed.

The present councils, answering to the political divisions of the country, are replaced by commissions of public hygiene, with a service of inspectors and co-inspectors, responsible to the government, nominated by the ministry, receiving compensation from the state, and charged with initiating and executing all measures of public health.

Physicians are obliged, under penalties, to report to competent health authorities cases of contagious and transmissible diseases.

A great deal has been done in the last year in the way of perfecting and making uniform the various systems of quarantine. The United States Congress passed a law which was approved in August, 1888, providing for permanent quarantine establishments

—three on the Pacific coast, three on the Atlantic coast, and two on the coast of the Gulf of Mexico, each of which was to be equipped with the necessary appliances for disinfection and speedy restoration of a vessel to the commerce fleet.

Owing to the restrictions placed on commerce in the West Indies, many of which are vexatious and altogether unnecessary, the British Secretary of State for the Colonies authorized, in July, the assembling of a conference to discuss the desirability of inaugurating a uniform system for the British possessions, and the meeting took place in British Guiana, in October.

In England the medical journals have teemed with articles *pro* and *con* referring to the compulsory notification of infectious disease, and it is believed that the difficult questions of ethics and etiquette which arise when a health officer undertakes to compel notification, or visit the patient himself or by deputy, is solved when the health officers cease to be practitioners of medicine—that is to say, that the medical officer of health shall not be in general practice.

#### DISPOSAL OF THE DEAD.

F. Eklund, corresp. ed. in Sweden, sends a review of Tierne Lindell's work on this subject<sup>1001</sup> in which the most important researches are dwelt upon. The author reaches the conclusion that, from a sanitary stand-point, burial in the ground cannot be censured, and that it is absurd to demand a reform of present methods from hygienic motives; and that cremation, from a medico-legal point of view, is open to very serious objections.

Although cremation is recognized in France by law, its application is suspended until a Presidential decree, deliberated on in the Council of State, shall determine the conditions to which incineration shall be subjected. A crematory with three ovens was constructed at the cemetery of Père LaChaise; the system adopted was very nearly that of Gorini, of Milan, now abandoned in Italy because of its imperfections. Messrs. Chassaing and Guichard, delegated by the Municipal Council of Paris to study abroad the various systems of incineration, declared in their official report that "none of the systems in use in Italy were practicable." M. H. Marini, an engineer, proposes a new apparatus based on these principles: Before being completely reduced to ashes, the human body must pass through the phases of *desiccation*, *combustion*, and

*incineration.* For desiccation a very intense heat is desirable. This, by experiment, is the temperature of dull-red heat, 500 Centigrade, the best for the rapid elimination of the aqueous fluids and the fats contained in our organism (nine-tenths of the weight of the body). Extreme temperatures produce *vitrified fragments*, unreducible, which hinder the success of the operation. Combustion is readily brought about by the temperature of the oven, especially if accelerated by the propulsion of a current of oxygen. Incineration, properly so-called, does not necessitate a considerable disengagement of heat, but the new chemical combinations require the presence of a certain quantity of oxygen. The total operation requires about one hour.<sup>1005</sup>

Crematories have greatly multiplied throughout the world during the year just past. In Buenos Ayres<sup>61</sup><sub>Oct. 30</sub> the bodies of most of the persons dying of contagious diseases have been so treated. Out of 993 bodies cremated, 742 were of persons dead of cholera, small-pox, and other contagious diseases.

The famous crematory at Milan has lately been made a source of revenue to the government, if we are to believe a statement to the effect<sup>22</sup><sub>Sept. 6</sub> that the custom-house officers at Milan laid an import duty of 350 lire (\$70) on a single body brought from Paris for that purpose, an export duty of the same amount being also extorted on the return of the ashes. The new crematorium at Milan is situated at the extreme end of the Campo Santo, just outside the walls of the city. The temple, as it is called, is a building in the Doric style, constructed of stone and having an open façade supported by columns, from behind which rises a tower which, as seen from the outside, looks as if it formed part of the temple, although, in reality, it stands quite by itself and is the chimney. The inside of the building is divided into several rooms, in the first of which the religious rites are performed; its walls are lined with funeral urns containing the ashes of many of those who have been cremated at Milan. There is a separate room in which the bodies are placed pending cremation, and a third in which the relatives and friends spend the two hours occupied by the cremation itself. There are two furnaces—one being for general use and the other for the bodies of persons who have died of contagious diseases and are not natives of Milan. The body is not visible to the on-lookers when being put into the furnaces, nor are the ashes afterward. It is

stated <sup>2</sup> that "crematoriums will be erected in the course of the year at Turin, at San Remo, at Bologna, Verona, Pavia, and one or two other towns."

The Church of England Burial Reform Association, <sup>Feb. 18</sup> has set itself to accomplish certain specific reforms: (1) Timely instead of delayed burial; (2) the use of readily perishable coffins; (3) the selection of soil appropriate to the purpose of burial.

At the annual session of the Ohio State Sanitary Association, held at Toledo, February 9th and 10th, a paper read by Lewis Susser aggressively favored cremation, the author stating that the upturning of the earth in which persons dying of small-pox had been buried, even many years before, was the cause of local epidemics. In the discussion following all the speakers favored cremation.

Dr. Duncan, <sup>July</sup> at a meeting of the Glasgow Southern Medical Society, pointed out that the system of pit-burial was horrible in the extreme. In a certain cemetery at Dalbeth that he had seen a new pit opened on the slope of the ground near the river. The soil was damp clay. The pit measured seven and a half feet square and twelve feet deep, containing ten or twelve adult coffins and a large number of little ones. They were lying at the bottom of this damp clay-hole quite uncovered, without even a boarding over them, and remained so until filled up with coffins to within three feet of the surface, when probably about thirty adult coffins and as many children's would be contained in the pit. The smell at that time from the decomposing bodies was very disagreeable—in fact, extended through the whole neighborhood. Even the undertakers cry out against this state of affairs, and yet the funeral service is read over the edge of this mass of corruption and the relatives and friends alike are subjected to the unwholesome and dangerous effluvia.

As a result of this system of pit-burial, the soil beneath and the air above become tainted with the unwholesome and poisonous products of decomposition. The sewers leading away the subsoil drainage become foul, and the streams into which these sewers empty become tainted, not only with the products of decomposition, but also with the germs of the contagious diseases. These places are not graves, but pits of putridity and mines of profit to the shareholders. The cemetery companies reserve to themselves the

right to reallocate common ground at the end of ten years. The remains of the dead may be thrown aside, and the soil which has been winnowed from the remains of its former occupants may again be used for the burying of a fresh pile of coffins. There may be no end to the pollution and no end to the desecration of the graves of the poor under the present *régime*.

Pietra Santa,<sup>153</sup> in discussing the question of burial, states that the primitive custom of savage people was the abandonment of the bodies of the dead to the omnivorous birds and to the beasts of prey, and, under the impulse of the progress of civilization, the more humane practice of carrying the body to ferocious beasts. As civilization further advanced, under the usual practices of a religion which transformed into imaginary gods their great men and their heroes, a new practice became obligatory, and the destruction by fire, or cremation, was naturally established for all. The first ideas of embalming doubtless originated with the Egyptians, the greatest masters of this art, under whom it became a public institution. Three modes of embalming were anciently adopted: (a) The embalming proper, where certain odoriferous substances and odoriferous essences were introduced into the body after it had been immersed in a saline solution; (b) the desiccation or preservation by extracting the water which had formed in the tissues, and (c) by the injections of preservative solutions into the blood-vessels.

Ogier,<sup>153</sup> has made an analysis of the gases received at the summits of three crematories, and has found in two successive samples—

Carbonic acid, . . . . .	3.47	4.16
Oxygen, . . . . .	16.20	16.15
Nitrogen, . . . . .	80.00	76.68
Total, . . . . .	100.00	99.99

(Neither carbonic oxide nor hydro-carbons.)

As an evidence of water pollution from cemeteries,<sup>44</sup> it is stated that in the early days of Los Angeles, Cal., a spring existed at the foot of the bluff on which is the old city cemetery, and which had long been used for household purposes by the residents, but in the course of time its waters became so offensive that it could no longer be used.

#### LIGHT.

Gréhan<sup>3</sup> reported some studies on illuminating gas to the Paris Academy of Medicine. He found that the air obtained at

the burner by means of aspiration contained 5 per cent. of carbonic acid gas, and much less than its normal proportion of oxygen. He believes that to prevent the entire vitiation of the air of the room where many of these burners are in use, it will be necessary to introduce air from without by means of tubing. To determine the physiological effects resulting from incomplete combustion of the gas, Gréhant placed in a narrow chamber, twelve cubic metres in capacity, a Bunsen burner, which he lighted in such a manner that the combustion of the gas took place underneath and produced acetylene. While the combustion was taking place he prepared the carotid artery of a dog, from which he extracted some blood in a normal state, containing 44.2 centimetres per cent. of carbonic acid and 19.5 centimetres per cent. of oxygen. A ligature was then applied to the central end of the artery, and a little water was injected into the glass tube fixed in the artery, so as to be able later on to withdraw some more blood without a clot being formed. The animal was then left in the chamber. At the end of forty minutes the confined air had the disagreeable and very pungent smell characteristic of acetylene. The dog lay down on its side. At the end of an hour and twenty minutes the animal barked plaintively and became unconscious; it was then killed and a second sample of blood drawn from the carotid gave the following analytical results: 30.3 centimetres per cent. of carbonic acid and 6 centimetres per cent. of oxygen. Further chemical experiments showed that this considerable diminution of oxygen was due to the presence of 20 centimetres per cent. of oxide of carbon in the blood. This experiment proves conclusively that the quantity of oxide of carbon given out by a Bunsen burner burning from below during two hours, in a chamber of twelve cubic metres capacity, is sufficient to almost completely oxycarbonize the blood and endanger the life of an animal exposed to its effects. <sup>2</sup><sub>Jan. 21</sub>

The College of Physicians and Surgeons of Philadelphia, having learned that the municipal authorities of that city were entertaining a proposition to introduce water-gas for lighting purposes, appointed a commission to investigate the sanitary and scientific features of the subject and addressed a communication to the Mayor describing its dangerous character. <sup>19</sup><sub>Apr. 21</sub>

"This gas is prepared by several processes, the principal of



all of which is the passage of superheated steam through anthracite coal at a high temperature. As the result of the decomposition, a nearly odorless gas is obtained, chiefly composed of hydrogen and carbonic oxide and burning with little light but with very great heat. This first product is the so-called *fuel water-gas*, and has been extensively employed for heating purposes. In order to employ it as an illuminant it is necessary to add to it certain highly carburetted compounds, which are usually obtained by the decomposition of some of the so-called coal-naphthas. Owing to the large amount of carbonic oxide which they contain, both of these water-gases are exceedingly poisonous. As the fuel water-gas gives no notice of its presence in the atmosphere, save by the production of growing apathy and unconsciousness in those who breathe it, its use on a large scale is attended with a practical certainty of a large loss of life, and its manufacture and public distribution should be forbidden by law. Illuminating water-gas is no less poisonous than the fuel water-gas, but in the process of enrichment with carburetted compound it obtains an odor which approximates in intensity that of coal-gas, and consequently gives warning of its presence in the air.

"In Massachusetts the manufacture of water-gas is forbidden by law, and the attempt to have the law repealed has led to a protest against the legalization of the use of any gas which contains more than 10 per cent. of carbonic oxide, the protest being signed by most of the leading physicians of the State, as well as by the various health officers and medical examiners in the various towns and counties. The College of Physicians of Philadelphia has adopted resolutions in accord with this protest, and we do not see how any one who is conversant with the history of the matter and with the results of the use of water-gas, and who has no interest in the matter, can be at discord with the opinion which has thus been authoritatively expressed in two great cities." <sup>80</sup>  
May 15

Defontaine,<sup>3</sup> presented an article to the Paris Surgical Society on a form of electric sunstroke, to which workmen employed in operating the electric forgers at Creuzot are subject. These furnaces produce an intense light, stated at four hundred and fifty ampères, equal to ten thousand Carcel lamps, or about one hundred thousand candles. The workmen, although feeling no heat, experienced an acute pain, in every respect resembling that of sunstroke.

The neck and chest became red and painful. The surfaces affected were denuded by a desquamation analogous to that following a burn at an early stage. Intense ocular congestion, with sharp pains and watering of the eyes, were observed, the retina being greatly impressed in spite of the use of glasses. At other times the congestive phenomena were more intense, the conjunctiva was tumefied, and the pain prevented the patients from sleeping. In these cases retina troubles, characterized by subjective symptoms of fugacious and varied scotasma, were added. The patients perceived complementary colors.

The characteristic of all these troubles of formidable appearance is to disappear rapidly. A case of consecutive neuro-retinitis has been reported, but its action is doubtful.

They were affected by torpor, and when visual sensation returned objects seemed colored a saffron-yellow. The noxious influence of electric light appears first upon the teguments of a part, then in the eyes. Foucault noticed these symptoms in experiments upon himself, and Charcot also pointed them out to the Biological Society of Paris. According to the latter, these phenomena result from the particular influence of certain rays of the spectrum—the view most in favor to-day. Charcot exposed himself to an incandescent electric hearth during an experiment of welding steel. He uncovered his arm, protected his eyes with yellow and red glasses, and placed himself 1.50 metres from the hearth. The experiment lasted a few minutes. In half an hour there was itching in the forearm, followed by intense redness. He slept badly at night. All phenomena disappeared in four days, but were followed by the usual desquamation. Without any appreciable congestion having been produced, there was a notable fatigue in the eyes. These symptoms appeared with greater intensity in a workman who had exposed himself at the same time, but for a longer period.

The gravity of the symptoms depends both upon the intensity of the hearth and upon the time of exposure to its influence. It has been calculated that over two hundred ampères would be dangerous.

“The Influence of Light on Micro-organisms” is the title of a thesis by Dr. Georges Gaillard.<sup>211</sup><sub>Feb. 12</sub> The author grouped the results obtained at different epochs by observers occupied with this

subject, and added some new experiments, deducing from his researches and particular observations the following conclusions: "The light of the sun gives increased activity to a certain number of bacteria when it determines a disengagement of oxygen around them. It does not appear very favorable to the production of coloring matters by the chromogenous microbes. Bacteria in general, and several bacilli and pathogenic micrococci (in the state of mycelium and spores) lose their vegetality rapidly enough when they are exposed to the rays of the sun. The rapidity with which vegetality disappears varies with the nature of the ambient medium. At a given moment the virulence of several amongst them can be attenuated to a degree which permits of their employment as vaccine (*bacillus anthracis*). The light of the sun is favorable to the development of several microscopic mushrooms and yeasts. The action of light is increased in the presence of air, diminished in the absence of this gas. The different rays of the spectrum have all a certain activity less than that of composed light. The action of the latter is in connection with the intensity of its glittering rays."

#### HEAT.

In an investigation on the heating of railway sleeping-coaches, Harvey Reed,<sup>462</sup><sub>p.450</sub> of Mansfield, Ohio, states that of the cars examined by him,  $6\frac{2}{3}$  per cent. were heated by stoves,  $36\frac{2}{3}$  per cent. by hot air, and  $56\frac{2}{3}$  per cent. by hot water.

In cars heated by hot air the difference between extremes of temperature while running was from  $2^{\circ}$  to  $14^{\circ}$  F. with the mercury outside at  $30^{\circ}$  and  $15^{\circ}$  respectively. The extremes of temperature between cars heated by hot air while running and standing was from  $8^{\circ}$  with the thermometer outside at  $30^{\circ}$  above zero in one instance, and  $15^{\circ}$  above zero in another, to  $18^{\circ}$  with the mercury outside at  $4^{\circ}$  at one time and  $15^{\circ}$  above zero at another.

In cars heated by hot water there was found a difference of temperature while running, varying from  $0^{\circ}$  to  $27^{\circ}$ , with the mercury outside at  $22^{\circ}$  and  $27^{\circ}$  respectively above zero, and a difference of temperature between running and standing varying from  $5^{\circ}$  to  $29^{\circ}$ , with the mercury outside at  $4^{\circ}$  and  $27^{\circ}$  respectively above zero, while the difference between extremes standing varied from  $1^{\circ}$  to  $27^{\circ}$ , with the mercury outside at  $16^{\circ}$  and  $27^{\circ}$  respectively above zero.

By the same methods of heating a variation of temperature between the bottom of the car and the level of the head while sitting was found varying from  $12^{\circ}$ , with the mercury outside at  $18^{\circ}$  above in one instance and  $12^{\circ}$  above in another, to  $30^{\circ}$  with the mercury outside at  $12^{\circ}$  above zero. He found in one case  $30^{\circ}$  difference of temperature between the level of the head and that at the surface of the floor. Dr. Reed has come to the conclusion that the method of heating passenger coaches and sleeping-cars is radically defective and requires change. In a discussion of the question of steam-heating for railway coaches, <sup>60</sup><sub>Sept. 29, Oct. 6</sub> the conclusion is reached that no improvements have recently been made, and that while some companies have loyally tried to perfect the system no definite improvement has resulted.

#### EFFECTS OF HEAT ON THE BODY.

Dr. H. S. Tucker, <sup>192</sup><sub>July</sub> of Chicago, in an article on sunstroke, states that an observation of cases of sunstroke coming under his care gave the following results:—

In the majority of cases the person suffers from exhaustion at the time of the attack and is suddenly seized with intense pains in the head; there is a feeling of weakness, and in some cases a fullness in the epigastrium with nausea and vomiting. If the attack is light there will be only a transient insensibility, but in severe cases the patient soon becomes comatose. The pulse may be slow and full at first, but as the case approaches a fatal termination it becomes weaker and increased in frequency, convulsions being of frequent occurrence. One feature in these cases is the great rise in temperature, the thermometer sometimes registering as high as  $110^{\circ}$  F. ( $43\frac{1}{3}$  C.), and in all cases where the thermometer indicates  $107^{\circ}$  F. ( $41\frac{2}{3}$  C.) and over a fatal termination may be expected. In a case but recently under his observation and which is now convalescent, the temperature was  $106^{\circ}$  F. ( $41\frac{1}{10}$  C.). The treatment consists in the judicious use of such remedies as will lessen the body-heat and restore the normal secretions.

“Those who recover from sunstroke should be cautioned against immediate exposure to solar heat, as they are now very susceptible to its effects. We find, too, these patients are more or less troubled with nervous affections, many of which baffle the best efforts to relieve.”

## AIR.

M. Keldyche,<sup>22</sup> has published the results of a series of experiments on air drawn from hospital wards:—

“Air which has been saturated with eucalyptol will no longer give rise to colonies of bacilli in gelatine. The spores of fungi are able to pass unharmed, but as their action on the higher animals is probably limited, it is not a matter of much importance. If confirmed by independent observation this valuable quality renders the drug worthy of wide-spread employment, for no other disinfectant is known which can be relied upon to effect its purpose without rendering the air irrespirable, besides acting very injuriously on furniture, clothes, etc.” As is well known, the purity of air is enhanced in proportion to its distance from the earth. Gouverneur Smith,<sup>21</sup> of New York, in a recent article, proposes that houses shall be so constructed as to allow the utilization of the house-tops, whenever the weather will permit it, as places of resort for the family, in order to secure the benefits of plenty of fresh air.

In an editorial article on the effects of insolation on dwelling-houses, the writer states that walls which never meet the direct rays of the sun are cold, damp, unhealthy, and covered with mould. Beaten by rain and snow, condensing the aqueous vapor of the atmosphere, absorbing water from the soil through their foundations, they become impregnated with an enormous quantity of water which can be rapidly evaporated only by therapeutic action. This renders the ground-floor of houses which open on courts or narrow streets unhealthy. The advantage of the insolation of buildings, *intus et extra*, consists solely in its calorific influence, for diffused light is sufficient for the indoor occupations of men, and is, indeed, preferable for such use.

In regions of the globe under the fortieth degree of latitude it is well to multiply as much as possible streets running in or very nearly in the direction of the meridian. Equatorial streets, always defective, should have a width much greater than their depth to permit the insolation of the side exposed to the south. The distance between equatorial streets should be sufficiently great to permit the construction, within the walls of the buildings, of a quadrangular court, the principal axis of which, directed to the

meridian, shall have a length equal to at least double the height of the houses. In localities situated between the equator and the thirtieth degree of latitude streets should be inclined from fifteen to twenty degrees toward the meridian. Being deeper than they are wide they will enjoy an insolation sufficient in winter and not excessive in summer. On the other hand, the inferior premises will receive direct light only at a short distance from the points of ingress of light, and the illuminating conditions will be less favorable than those of insolation.

In an exhaustive report on the air of coal-mines T. G. Nasmyth <sup>4</sup><sub>Am.</sub> states that the air is generally good in the coal-mines of England; that the ventilation is efficiently carried on, and the hours of work short; and in his tables of statistics he shows that there is no disease peculiar to miners, or any disease in excess existing among miners, and concludes by asserting that the conditions obtaining with the miner's occupation are as favorable as those of any other workmen. This opinion is borne out by his vital statistics. The method of examination which he adopted is as follows:—

For the temperature of the mines the readings of a wet and dry bulb thermometer at 9 A.M. were made by a mine inspector on whom he could depend. The method for the estimation of ammonia was that of Wanklyn, Chapman, and Smith. For the determination of organic matter he used Professor Carnelley's method, the principle of which is the reduction of potassium permanganate. For the estimation of carbonic acid the method adopted was that of Pettenkoffer; for the estimation of oxygen, Fränkel's method; for micro-organisms, the method of Hesse. Nasmyth claims that Koch's method is useful, but the results are not quantitative. He did not find uniform connection between impurity of the air and quantity of the organisms found therein, and says that the presence of men and horses had a very great influence both on the numbers and kind of colonies, increasing the numbers and varying the kind. Where there was a crop of mould, or near where men and horses were, there bacteria were obtained.

R. J. Petri <sup>58</sup><sub>M.S.H.S.</sub> speaks of a new method of demonstrating the presence of bacteria in the air. He approves of Hesse's aspiration method, which he has modified by causing the air to be filtered through a porous material which can easily be mixed with the

culture (gelatine or agar) and at the same time be sufficiently transparent. He has found this in a fine-grained sand, which he filters through a wire-netting until he obtains a requisite size; that is, grains which will vary from .25 to .5 millimetre. This sand is first sterilized by heating it to a dull-red. heat, then poured into sterilized gelatine tubes. It is subsequently made into filtering plugs as a control filter. The construction of the plugs is by means of fine wire-netting, which clings by its borders closely to the tubes, so that the sand can be rammed between two opposing pieces of wire-netting. The wire-netting tops are skillfully constructed and the size of the sand-filters is carefully adjusted to meet the conditions of working. This tube is again sterilized and the air is drawn through it, either by means of a water-pump, which is graduated by means of a gasometer, or by a swing air-pump, graduated by the same means. In practice it is found that under the speed of suction employed by the author all the germs are caught in the first filter.

The impregnated filter of sand is then with all imaginable speed spread over the lower of two shallow glass dishes—sterilized, of course—and liquid gelatine poured over it. It is, by means of a sterilized instrument, parted as evenly as possible at the bottom of the lower dish.

Practically the same method of examination of air has been pursued by Frankland. He examined the air in Surrey Downs and in London, in the garden of Hyde Park, and in the exhibition street leading to South Kensington Museum. Dr. Petri states that he had previously explained to Frankland his method and therefore claims the priority. In an article on conditions which tend to render the atmosphere of a locality aseptic, Whittaker<sup>9</sup><sub>Oct. 6</sub> writes as follows:—

“Kümmel claims to have found all kinds of micro-organisms on the walls of his operating-room. Emmerich found on the walls of the pathological institute of Munich the micro-organisms of erysipelas, a discovery which was verified by cultivation and inoculation. Eiselsberg found deposited on slides placed on and under the beds of Billroth's wards the staphylococcus aureus, and later, in the same way, Fehleisen's streptococcus. Uffelmann found Friedländer's pneumonia bacillus in the air of a cellar under the hygienic institute at Rostock, and Cornil, without doubt, inoculated

tuberculosis with sponge scrapings from head-boards of beds occupied by phthisical patients. . . . Esmarch rubbed down definite spaces of wall-paper with thoroughly sterilized sponge and cultivated the germs thus removed in various soils, finding thus, on an average, from various rooms, fifty-one germs in twenty-five square centimetres, from which he computed twenty thousand four hundred to the square metre, and to a whole room nine hundred and seventy-nine thousand two hundred."

"The frequency of tuberculosis among the insane led the author to examine the walls of three asylums, all of which furnished a virulent tuberculous virus. Dust removed in eleven cases from different places in the near vicinity of tuberculous patients was introduced into thirty-three animals, of which sixteen died of intercurrent disease, three were found to be tuberculous, the remaining fourteen healthy. . . . Of three hundred and eleven animals in all, inoculated with dust from rooms inhabited by phthisical patients, one hundred and sixty-seven died soon after infection, fifty-nine—*i.e.*, one-fifth of the number—were found tuberculous, and eighty-five were healthy."

In regard to the contamination of the air of rooms by tuberculous matter, it is stated that the walls and head-boards of beds of twenty-one rooms in seven hospitals in Berlin occupied by phthisical patients were scraped, and ninety-four animals were inoculated with the scrapings. Two-thirds of the rooms furnished tuberculous matter. Of the ninety-four animals, fifty-three died of other diseases, forty-two were killed, twenty were found tuberculous, and twenty-two sound.

Corrado Tommasi Crudeli<sup>402</sup> gives as the result of Doctor Schiavazzi's researches that in the malarial atmosphere of Pola (Istria) there is found constantly present a bacillus morphologically identical with that described by Klebs and Crudeli; that this same bacillus has been found in the waters of intensely malarious regions. "From the above, Schiavazzi draws the conclusion that the bacillus found by him is precisely identical with the bacillus discovered by Krebs and Crudeli in 1879, and that it is really and positively the cause of malaria."

Joseph Jones<sup>402</sup> made a series of experiments on the atmosphere of infected localities and houses containing yellow-fever patients as long ago as 1878. His method consisted in



passing from one hundred thousand to four hundred thousand cubic feet of air through small fragments of ice and ice-cold water, and then subjecting this water to examination with the higher powers of the microscope. These experiments were, of course, conducted before the method of germ propagation was understood, but he found minute spores, microbes, and micrococci, varying from one ten-thousandth to one twenty-thousandth of an inch.

#### SOIL.

Concerning soil, Maurel<sup>26</sup> states: "It is always easy to distinguish healthy from marshy soil. The fauna and flora of marshy waters differ only in point of quantity from those of drinkable waters; the species which exist in the one may be found in the other. Marsh air differs from that of healthy districts in the presence therein of bodies which must be regarded as amœbæ in the course of development. These bodies are readily destroyed by desiccation, which is resisted the more that they are the less advanced in development; in the perfect state they resist incomplete desiccation. These researches, pursued through six years in France, in the Antilles, and in the extreme East, have shown that the same organisms that exist in the air of marshy regions have been found in the blood of persons suffering under marshy diseases. Dr. Maurel proposes to follow up his researches."

Dr. Fränkel<sup>58</sup><sub>Bd. 2, H. 1</sub> has written a paper on the examination of the soil. He practices the introduction of the specimen of earth to be examined directly into the gelatine, and breaks it up into minute particles by means of a stout platinum wire. After this mixture the gelatine is then poured on plates. He prefers to measure the earth rather than to weigh it, and has constructed a platinum spoon which will contain about one-fiftieth of a cubic centimetre. This spoon is sterilized each time before use, in order to prevent admixtures of borings from different strata. He has constructed a special borer. He summarizes his results as follows:—

"The upper layers of even a virgin ground are studded with micro-organisms of the greatest variety down to a varying depth, mostly of three-quarters of a metre; but at this border-line a sudden and great decrease in the number of bacteria present occurs, as the deeper layers, even those belonging to the ground-

water region, are poor in or even destitute of germs, whether aerobic or anærobic."

#### WATER.

The Massachusetts Board of Health made a special report upon that part of their work which relates to the water supplies of the State. The duty of guarding the water supply was placed in the hands of the State by the General Court in 1886, and an appropriation of thirty thousand dollars was given to the Board by the Legislature in 1887. The report of the work for the year 1887 was divided into three sections: "1. Advice given to towns, corporations, and individuals in regard to appropriate sources of water supply, the best way of preserving the purity of the same, and proper measures for the disposal of sewerage. 2. Collecting information in regard to all existing public water supply in the State, and arranging for such examination of these waters as may, from time to time, seem necessary. 3. A review of the present state of our knowledge upon the subject of sewerage disposal by irrigation upon land or other means; and experiments for the purpose of adapting the results obtained in Europe to the conditions existing in Massachusetts, or of devising new methods more adapted to our surroundings."

Dr. John C. McKowen,<sup>12</sup> writing from Capri, Italy, makes the following statement, which is at once interesting and instructive, concerning the water supply of Naples:—

"The water history of Naples furnishes an interesting chapter to the history of modern hygiene.

"Pure water from a mountain stream called Serino, some eighty miles from Naples, was brought into the city and distributed during the month of May, 1885. Cholera had ravaged Naples during the summer of 1884, but the introduction of pure water prevented a return of the epidemic in 1885. During the summer of 1885 cholera made as much havoc in Torre Annunziata and Castellamare (cities a few miles distant from Naples) as during the summer of 1884, because the inhabitants of those two towns still used well-water. Many of the inhabitants of infected towns in Southern Italy and Sicily left their homes and sought refuge in Naples, whither they carried the disease, and in some cases these refugees died of cholera, but the pure Serino water prevented any spread of the epidemic among Neapolitans. The same thing occurred in

1886. During the summer of 1887 the Serino aqueduct was broken for three days, and Neapolitans were compelled, in the absence of Serino water, to drink well-water again. A week afterward the immunity from cholera produced by the use of pure water during the summer of 1885-6 ceased and the epidemic broke out again. The cholera caused only a slight damage, because the aqueduct was soon repaired, and the use of pure water soon put an end to the epidemic. Serino water enjoys such a reputation in the whole of Southern Italy that the railways have built portable cisterns to carry water from Naples to infected towns or cities, and the results have been marvelous. As an instance, Barletta had two hundred cases of cholera daily, and a liberal supply of Serino water furnished to the city by the railway reduced the number to twenty daily after forty-eight hours' use of pure water. Not only has Serino water produced such good effects with cholera, but the records of the hospitals for infectious diseases show equally remarkable results. Statistics for three years previous to the introduction of Serino water and for the three years subsequent are as follows:—

	Before.	After.
Typhoid, . . . . .	333	76
Typhus, . . . . .	317	77
Low fevers, . . . . .	82	26
Intermittent, . . . . .	93	62

A. Massie<sup>248</sup><sub>Feb.</sub> has given an analysis of the waters of the twelfth region of Tonkin, which extends from Than-Moi to Cao-Bang and Moxat, and constitutes a vast region, mountainous and intersected by many valleys. The soil of the valleys is alluvial, on a bed of humus, which varies from between 0<sup>m</sup> 15 and 0<sup>m</sup> 30 in depth. He gives the following *résumé*:—

“The calcareous waters, of which the Dang-Dang is a type, are without doubt the best, and must be sought for with attention in the neighborhood of the established posts. Their presence should also have weight in the choice of installing a new post. The pluvial waters are from sources in the sandstones, the most complete types of these waters being found at the post of Tien-Ho. They contain too little lime, and the presence of the great quantity of organic matter is due to the lack of secular soil which covers all the round eminences over which they flow. The waters of the river Sang-Ki-Kang are a mixture of the two first. The position of villages on its banks enriches it with organic matters,

making it the most unhealthy for use. A noticeable feature is the lack of chloride in the waters of the region, the calcareous water of Thon-Moi alone presenting chlorine in a notable proportion."

*Water of Tunis.*—Dr. Tissot,<sup>185</sup><sub>June</sub> in an article entitled "*La Campagne de l'Aviso*," speaks of the impure character of the water of Tunis and advises the use of distilled water; and that where this is not available the water of all wells and cisterns be filtered before using.

There has been a popular prejudice against the drinking of ice-cold water in quantity during hot weather on the Continent, and a short time since the sudden death of twelve workmen employed in a manufactory of artificial manure at Praire-au-Duc caused great consternation.

The fatal result in all the cases was due to pneumonia, and it was believed that the disease was caused by the inhalation of the phosphates and sewage-dust. An inquiry was ordered, and the premises were carefully inspected. Nothing was found in any of the departments that could reasonably be supposed to have caused the deaths, but it was ascertained that the men, when perspiring profusely, were in the habit of drinking copiously from the "cold bell," a refrigerating vat in which water is kept at a very low temperature for manufacturing purposes.<sup>22</sup><sub>July 18</sub>

In Japan there has been a great improvement in the water supply during the past year. The Governor of Yokohama has had new water-works constructed, and in Tokio arrangements are being made for bringing a pure supply into the city. In Paris a project has been submitted to the municipality for furnishing the city with an abundance of water from the Lake of Neuchâtel in the Swiss Alps. It is proposed to draw off the water from this lake by heading two hundred and sixty feet below the surface of the lake, where it has a temperature of only forty-three degrees.<sup>22</sup><sub>Sept.</sub>

The question of water supply has of late agitated many of the cities on the Great Lakes of the United States, and especially the cities of Chicago and Cleveland. At the Cuyahoga County Medical Society Dr. Ashmun<sup>222</sup><sub>Oct.</sub> presented forcibly the danger to the water supply from the pouring into Lake Erie of the sewage from the river. Professor Smith, of the Case School of Applied Sciences, made a number of analyses and arrived at the conclusion that the water supply is at all times slightly contaminated by shore influ-

ences; that in times of high current in the river the contamination is serious; that there is a difference in the purity of the water along the city front and at different distances from the shore. The conclusion was reached that as there is a slight current to the eastward in the lake it is only necessary to divert the sewer system east of the city in order to insure purity of the water.

In New York the question of the water supply has been agitated during the past year, and at a meeting of the Medical Society, held September 24th, John R. Bartlett<sup>59</sup><sub>Sept. 29</sub> offered resolutions to the effect that there was a scarcity of water in the city; that six or more years would be required for the new aqueduct system to be completed; that the upper portion of the city would soon require all the water that could be procured, and that the city was now endangered by the insufficient quantity of water. These resolutions were adopted.

The Massachusetts Board of Health<sup>9</sup><sub>Nov.</sub> has been investigating the purity of the ice supply of Boston and vicinity. Ice taken from the cart of a certain ice company was analyzed beside that taken from Rye Beach, and the result showed that, while the organic and volatile matter was 0.31 in the Boston ice, it was 5.72 in the Rye Beach ice; and, while the chlorine was 0.02 in the Boston ice, it was 3.23 in that from Rye Beach.

The scarcity of water in many of the large towns of Great Britain<sup>1006</sup><sub>Apr. 4</sub> has caused recent investigations into the proposal to bring sea-water in mains from the coast in order that water for flushing sewers, watering streets, extinguishing fires, baths, closets, and the like may be used for the common water supply, while the drinking water shall be supplied from other sources.

In regard to the boiling of drinking water Tellier<sup>9</sup><sub>Nov. 24</sub> finds that boiling water is not destructive to certain microbes. Boiling also deprives it of many of its salts and gives it an insipid taste.

Hence he recommends that it be baked at a temperature of 202° F. The salts are not dissipated by this method, and the water remains palatable and entirely free from the same microbes that are destroyed at 212° F.

F. A. Castle<sup>1</sup><sub>July 7</sub> describes a water-filter which he has found so simple and inexpensive, and at the same time so serviceable, that he recommends it highly for the filtering of water for table use. He describes it as follows:—

"I took an ordinary glass pharmaceutical percolator (A) and packed the outlet with absorbent cotton (B) so tightly that the water could only flow in drops. By means of a piece of copper wire (C) for a bale, it was suspended from a hook on the lower side of one of the pantry shelves, over the shelf of the sink. As often as necessary water is poured into the percolator, and the water-pitcher is placed under the outlet. Whenever the cotton shows much discoloration (a thing which is easily observed, owing to the percolator being of glass) the maid replaces it with fresh absorbent cotton. It is in all respect the most practical and cheapest filter I know of, and has no machinery to get out of order, no patent right to carry, and possesses the advantage over most filters that the filtering medium is always under observation, so that there is little risk of contamination of the water by accumulations of filth."



*Public Baths.*—Eklund, corresp. ed. at Stockholm, alluding to Oscar Lassar's recent article,<sup>572</sup> states that the author is much interested in the construction of small public establishments for warm shower-baths, with soap and towels, at a trifling sum. A space from two to three square metres is required for each small room, and three shower-baths (douches) an hour can be given. As soon as the bather pulls a cord a douche in the form of rain descends which wets the bather from one and a-half to two minutes. Not more than ten litres of water can be used, while five litres will suffice. Lassar advises that the different associations take charge of the administration, while the community should donate the ground and water. The small capital necessary should be procured by shares among the citizens, manufacturers, and proprietors, who, instead of interest, will have the use of the baths for themselves and their subordinates. But he recommends the agitation of this question from a sanitary stand-point as of very great social importance.

#### ALIMENTATION.

*Milk Supply of Cities.*—At the meeting of the Ninth International Medical Congress Cyrus Edson<sup>462</sup><sub>p. 477</sub> read a paper upon the

milk supply of cities. He prefaced his remarks by the statement that "From a sanitary stand-point the milk supply of cities is second only in importance to the water supply. The most vulnerable portion of the community to the attacks of disease are children." Milk is the chief food of children, and its peculiar physical properties make it easy for the unscrupulous to tamper with it, and it readily conceals within its opaque body disease-producing material with which it may be accidentally charged. He believes, with Professor Vaughan, that the most important advantage secured to mash-fed children arises from the lessened danger of infection of milk with germs which may produce poisonous ptomaines. In 1885 Victor C. Vaughan, of Michigan, announced the discovery in poisonous cheese of a ptomaine which produced upon man symptoms identical with those observed in persons who ate of the cheese. Milk or other fluid to be tested for this poison should be kept in well-stoppered bottles, for if the fluid be exposed to the air the tyrotoxicon may decompose in a few hours. The filtrate from the milk or the filtered aqueous extract of cheese should be neutralized with sodium carbonate, then shaken with half its volume of pure ether. Purified tyrotoxicon is insoluble in ether, and it probably owes its solubility in ether at this stage to the presence of impurities.

An editorial<sup>9</sup> on the milk supply of cities states that too great a risk is assumed in trusting to the honesty and intelligence of the milk purveyor or to the uncertain administration of laws for the protection of the supply. To this confidence many a young life has been sacrificed. Milk inspection is strongly to be commended, and no effort should be spared to render it as complete as possible, but in view of the danger, not so easily averted, of the possible contamination of the milk by pathogenic germs accidentally conveyed from different sources, either directly or indirectly imparted, it is the part of prudence to take the precaution of sterilizing all milk by boiling or steaming.

*The Danger of the Milk from Cows Affected with "Pearly Distemper."*—Professor Demme<sup>58</sup> publishes the following case: A boy, aged four months, suffered from tuberculosis of the mesenteric glands, of which he died. Microscopic examination discovered the characteristic tubercle bacilli in the partly cheesy glands. No localization of the disease was discovered in the intestinal mucosa

or in any other organs. There was no history of heredity upon the part of the parents. But the father had fed the boy from his birth upon uncooked milk from a cow fed upon dry fodder. The physician, after death of the child, caused the cow to be killed. The finding was very interesting and instructive. The left lung of the cow contained moderately large pearl-nodule, in which tubercle bacilli could be demonstrated. Microscopic examination of the milk pressed out of the depth of the udder also showed the presence of the pathogenic bacilli.

The above, like other similar observations, goes to show that by using raw cows' milk there is danger that occasionally tubercle germs, living and capable of reproduction, may be introduced. Hence milk of lower animals used in artificial feeding of infants, and also for drinking by adults, should always be boiled and never ingested raw or "warm from the cow."

*Matzoon*.—A fermented milk food called "Matzoon" is largely used in America and adjacent countries, and is made by but one producer in the United States.

It is a food produced by the fermentative changes in milk by the action of the ferment *pericillium glaucum*. Professor Nixon, of the University of Pennsylvania, states that by placing a small colony of these hyphomycetes in two ounces of warm milk, kept at the temperature of the living body for twenty-four hours, he had a pure "matzoon" produced. Unlike "koumiss," it is almost free from carbon dioxide, which fact permits of its use in cases of indigestion associated with weak hearts. He has found it tolerated by patients suffering from gastro-intestinal catarrh when no food other than the liquid meat foods were borne. Some children can digest "matzoon" when cows' milk is rejected.

*Odor of Flesh*.—In the normal state the flesh of all animals has its own characteristic odor. Beef has a special, insipid kind of smell, modified by the different modes in which the animals have been fed. Thus, it is stated that the flesh and milk of cattle in the polar regions have a fishy odor because the absence of pasturage obliges the inhabitants to feed their oxen and cows on fish. Veal smells of milk, mutton of wool and sometimes grease. The normal odor of pork is insipid and offensive, but when the pigs are fed on offal the flesh has a pale, cachectic hue and an offensive smell and taste. The odor of poultry fed on corn differs from that



of poultry artificially fattened. In a diseased state meat emits a typical odor resembling the breath of a feverish patient. "Feverish" meat is always unfit for consumption on account of the leucomaines which it may contain.<sup>2</sup><sub>Nov.2</sub>

*Adulteration of Food.*—Putteman<sup>6</sup><sub>Nov.10</sub> has recently published an interesting account of the adulteration of food and the measures adopted to check it in the community of Schaerbeek (Brussels). The police, who especially watch those retail dealers who sell their merchandise at prices below those generally quoted for the article concerned, procure the samples of food, hand half over to the analyst, and retain the other half for the disposal of the court of justice in case proceedings should follow. This mode of procedure dates from 1872, but it needs to be elaborated, as has already been the case in Brussels and Ixelles. In these communities every person who has bought any article of consumption of which the purity appears doubtful can submit it without expense to the official analyst. In all, one thousand nine hundred and twenty-nine samples have been examined, of which two hundred and thirty-two were found to be adulterated, while sixty-five samples of water were condemned as unfit for drinking purposes.

The military storehouses of France are furnished with large quantities of biscuits or croquettes of peptonized potatoes. They are expected to keep for two years, but those stored in June, 1887, have already been found spoiled. Moreover, each biscuit contains one hundred and fifty grains of peptones, and according to authorities cited by military journals, from one hundred and seventy to three hundred and seventy-five grains of peptones may produce fatal poisoning. It follows that if an officer or soldier were to eat two of these biscuits at a meal he would be poisoned.<sup>1</sup><sub>Nov.17</sub>

*Saccharine.*—Concerning the use of saccharine as an aliment, the Paris Committee on Hygiene<sup>14</sup><sub>Aug.10</sub> approved the following conclusions: 1. Saccharine should not be employed as an aliment in the place of sugar. 2. The employment of saccharine or its preparations suspend, or at least retard, the transformation of starchy and albuminous substances in the alimentary canal. 3. These preparations produce a profound disturbance of the digestive functions and increase dyspeptic affections. 4. The employment of saccharine is still too recent for the results of its use when entering into the daily food to be well determined, but now that it is estab-

lished that its presence during the process of digestion is harmful, we are able to come to the conclusion that saccharine and its different preparations should be proscribed as a food.

Constantine Paul finds that saccharine possesses marked antiseptic properties. A 1 : 100 solution controls the development of the staphylococcus pyogenes aureus, and because it prevents the development of all microbes contained in saliva, and a 1 : 200 solution prevents ammoniacal changes in the urine, he recommends its use in solution for lavage of the stomach and bladder.

A 1 : 500 solution hinders in an appreciable manner the action of pepsin, as the white of egg, fibrin, etc., as well as of diastase on starch, but does not arrest either action entirely. This may perhaps account for the digestive disturbances occasioned by its use as an aliment referred to by M. Worms.

The report of the Committee of the Société de Thérapeutique, Paris,<sup>5</sup><sub>July 10</sub> presented the following considerations upon this subject.

1. As a general rule, antiseptic substances, such as prevent fermentation, should not be employed in alimentation. 2. Any substance to be used as food should be susceptible of change in the animal economy. The committee further state, in reply to the question by the Minister of Commerce: 1. That saccharine is not a food and cannot replace sugar. 2. Its employment prevents the transformation of starchy or albuminous substances in the digestive canal. 3. It, therefore, augments dyspeptic disorders. 4. The committee are of the opinion that its use as an aliment should be prohibited.

*Wheat Food.*—Ephraim Cutter<sup>60</sup><sub>Dec. 1</sub> read before the Society of Science, Letters, and Art, of London, a paper on cleaned whole wheat. The advantages he claims for this are that it is a perfect food, and gives all the tissues of the body a chance to be fed and nourished. It is intended that it should take the place of oatmeal, which has less gluten, as compared with wheat, and is more difficult to digest. The objection to the tegumentary coats is not so great as some suppose. The food is free from yeast, and hence less liable to fermentation in the alimentary canal.

*Coffee.*—The question of the alleged noxious properties of coffee has been much mooted. Though lovers of the beverage decry this theory, M. Guelliot,<sup>35</sup><sub>Dec. 16, '87.</sub> of Rheims, France, would have us believe otherwise. He publishes observations upon

twenty-three cases of chronic cafeism that are at once instructive and interesting. Characteristic symptoms of cafeism are anorexia, disturbance of sleep, trembling of the lips and tongue, attacks of gastralgia, neuralgias, dyspepsia, and leucorrhœa that is often profuse and always the most persistent symptom of coffee poisoning. Following is the table of abnormal manifestations:—Anorexia in 18; disturbance of sleep in 16; trembling of lips and tongue in 16; leucorrhœa in 12; gastralgia in 11; dyspepsia in 10; neuralgia in various forms in 10; cephalalgia in 8; vertigo and convulsions in 4; constipation, alternating with diarrhœa in 3.

*Tea.*—Among the adulterations of tea have been found the leaves of the *epilobium angustifolium*, *epilobium hirsutum*, *prunus spinosa*, *ulvinis campestris*, *fragaria vesca*, *fraxinus excelsior*, *sambucus nigra*, *rosa canina*, and *ribes nigrum*.<sup>142</sup>  
Oct. 30

*Wine.*—The subject of “plastering” of wine has received much consideration from the Paris Academy of Medicine.<sup>10</sup>  
May 29 This process consists in the employment of plaster in the manufacture of wines, of which there are two principal methods. The first, which is the more ancient, consists in placing the plaster in the wine in cask. This practice limits the action of the plaster to the compounds held in solution in the wine. In the second method the plaster is thrown in with the gathering, when the grapes are pressed into the wine-casks; this is plastering the cuve. In this case the plaster remains in contact during the entire period of fermentation with the different parts of the grape, and is agitated not only with the compounds held in solution with the must, but also with those which throw out the seeds, pellicles, and stalks.

The proportion of plaster usually employed varies with the place, the nature of the soil, and the peculiar views of each vintner, but wherever and however employed, it is nearly always in excess. The average proportion seems to be about twelve hundred grammes to seven kilogrammes for a thousand kilogrammes of the “vendange,” producing about seven hundred litres of wine. The report concludes that: 1. The plaster modifies certain chemical characters of the coloring matter of wines. 2. It has the effect of decomposing and transforming the sulphate of potassa not only into bitartrate of potassa, but into neutral organic compounds, which exist in a very notable proportion in green as well as mature grapes. 3. Practiced with pure sulphate of lime, the plastering

does not sensibly augment the proportion of salts of lime retained in solution. 4. By a secondary reaction the plastering sets free sulphuric acid in wines sufficiently rich in alcohol and tartaric acid. 5. The prolonged use of strongly plastered wine presents serious inconveniences, whether on account of this increased proportion of sulphate of potassa, or by reason of the sulphuric acid, and it is very desirable to see a regulation of the practice.

*Deleterious Beer.*—Dr. George Hay<sup>161</sup> reports examination of two samples of lager beer in Pittsburgh, in which were found “picrotoxin in considerable quantity and lead in small proportion.” The picrotoxin showed that the beverage had been adulterated with the fruit of the *cocculus indicus*, of which picrotoxin is the poisonous principle. The presence of lead was due to the fifty feet of lead pipe connecting the supply in the cellar with the faucet in the saloon where it was dispensed. All beer contains free carbonic acid, which dissolves lead, also acetic as well as lactic acid, and, though the quantity of lead was small, still, small quantities frequently introduced into the system may occasion saturnine poisoning. He suggests that the pipes conveying the beer to the faucets should be of pure block tin, or, better still, of iron coated inside with an enamel containing no lead in its composition.

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#### EPIDEMIOLOGY.

*Compulsory Notification.*—While England excels in the collection of vital statistics, it is only in the past year that an earnest effort has been made toward simultaneous work in the direction of enforcing compulsory notification of infectious diseases. Dr. Tatham, of Salford, after securing the co-operation of twenty-five other municipal health authorities who furnished him with the results of the adoption of the system suggested in the act of the Local Government Board, undertook their tabulation and issued a weekly summary for the confidential use of the medical officers of health in the contributing districts. The Salford report deals with an average of about two thousand notifications a year. Dr. Tatham reports<sup>15</sup> that the main defects in the system of disease notification as at present carried out in England appear to him to be (1) “the merely local and the purely permissive character of existing legislation on the subject, and (2) the absence of any

system of central registration (similar to that of the Registrar General in respect of deaths) whereby the sanitary authorities of one protected town or area may be warned in time of the approach of any given form of disease from other and perhaps remote parts of the country."

*National Quarantine in the United States.*—An act "to perfect the quarantine service of the United States" was approved, August 2d, by the President. It protects quarantine reservation from trespass, creates seven new quarantine stations, and appropriates over half a million dollars for their support during the fiscal year. The act is amendatory of that of April 29, 1878, which authorized the Surgeon-General of the Marine Hospital Service to frame regulations for the national quarantine which, when approved by the President, should have the effect of law. The old law carried no penalty. This defect is now supplied. A regulation has been made by the Surgeon-General and approved by the President by which ships entering at quarantine in a foul or insanitary condition are subjected to *ordinary quarantine*. Such vessels coming in a foul condition for the second time in one year are subjected to *extraordinary quarantine*, which, in addition to the ordinary methods, includes painting, scraping, holy-stoning, etc., at great expense to the vessel.

*Epidemic Influences.*—Robert Lawson<sup>36</sup><sub>Sept</sub> delivered four lectures before the Royal College of Physicians at London, the first two on the above subject, the others on the "Epidemiological Aspects" of yellow fever and cholera respectively. In the former he states that epidemics pass uniformly northward until they finally disappear; that their spread, besides embracing a considerable space of longitude, gives rise to outbreaks in odd or even years respectively; that this development and spread must be due to the action of some natural force, and, when studying areas upon the map, he found that he could best define the position of the influence, approximately, at least, by referring it to lines of equal magnetic dip (isoclinal lines). For instance, with regard to fever, he gives a number of illustrations that go to show that there is a factor "which determines its appearance at points more and more to the northward in successive years; that this factor revives periodically every second year, or at some multiple of two years, passing like a series of waves over a more or less extensive portion of the earth's

surface." These waves he calls "pandemic." Of their ultimate nature nothing is known at present, but as their position from year to year seems defined, approximately, at least, by lines of equal magnetic dip, it is inferred they may be dependent in some way on magnetism. There is, he adds, no reason why the pandemic factor should proceed from south to north, nor why it should have a two-yearly period, and lead to a development of disease in some zones in a year with an odd number rather than an even one, or *vice versa*.

In my opinion the explanation is to be found in the fact that germ-life is extinguished at low temperature.

*Hospitals for Contagious Diseases.*—Dr. Buchanan has issued a memorandum, as medical officer of the London Local Government Board, on the provision for isolating hospital accommodation by local sanitary authorities. For a town such provision should consist of wards in one or more permanent buildings, with space enough for the erection of others, temporary or permanent. All buildings intended to receive either infected persons or things should stand at least forty feet from a close boundary fence, six feet six inches high. One bed for each thousand inhabitants is recommended as sufficing for the current requirements of the community. Dr. Buchanan urges the burning of all air from small-pox hospitals as it issues from the building.

Early in the year a mild epidemic of variola appeared in certain wards in Paris, and the proposal in the Municipal Council to erect large hospitals in the suburbs of the city gave rise to a warm discussion, many of the members declaring that such a plan would draw around the city a zone of infection.

After mature consideration, according to Dr. de Pietra Santa, our corresponding editor, the Council of Hygiene adopted the conclusions of the report of Léon Colin, the epidemiologist, in substance as follows:—

Isolation of contagious diseases can be accomplished by three different methods: 1. Isolation in special annexes to ordinary hospitals. The special annex appears to be an improvement on the promiscuous assemblage, in common wards, of patients with contagious or non-contagious disease; but it would be better to devote to these patients a neighboring establishment in which, from the beginning, they could be isolated. This annex should have, independent of the hospital, its distinct staff, its separate door

of entrance. Only, under these conditions, the annex would be a veritable hospital with the added danger of vicinity.

2. Hospitals outside the city. The erection, in the vicinity of Paris, of contagious hospitals, would give satisfaction to a number of legitimate interests; but, unfortunately, an official investigation demonstrates that all available sites on which these hospitals could be erected are approximated to populous centres or school districts, for which the dangers of infection are to be dreaded.

3. Special hospitals in the suburbs. It is easy to affirm, *à priori*, that sites could be found outside the city absolutely without menace to the sanitary condition of the surrounding population. The wide experience of the Asylum of Bicêtre, which during the siege of Paris (1870-71) received in five months more than eight thousand patients attacked with variola from all quarters of the capital, remaining entirely inoffensive to the inmates of a neighboring fort (Fort de Bicêtre), distant only a hundred metres, is a complete demonstration of the advantages of a hospital for variola *outside the city*.

The same measures may be applied to roseola, whooping-cough, and diphtheria, with the co-operation of the Préfecture of Police in providing speedy and special means of transport. The special annexes at present established in connection with several general hospitals in the interior of Paris should also be maintained for patients affected with variola, whooping-cough, or diphtheria, whose transportation to a distance would seem to be undesirable.

In case of cholera epidemics, on account of the usually much greater rapidity of the disease, it will be always well to reserve in the interior of Paris special annexes or hospitals for patients attacked with cholera morbus.

At the International Congress of Hygiene, at Vienna, the reports of Felix, of Bucharest, and Karl Bohne, of Vienna, both recognized the necessity for the establishment of annexes for isolation in general hospitals in large cities, and special hospitals or portable barracks outside city limits.

#### SMALL-POX EPIDEMICS.

Sheffield, England, suffered from an epidemic of small-pox. The death-rate<sup>6</sup> among the vaccinated was 4.4 per cent., and 41.3 per cent. among the unprotected, the mortality in cases

where the patients were under ten years of age showing an even greater difference, only two deaths occurring among ninety-five thousand vaccinated children to seventy fatal cases in five thousand unvaccinated ones. Leeds also suffered from a visitation of variola imported from the neighboring town.

San Francisco<sup>77</sup> had an outbreak of the disease which lasted from May, 1887, to the middle of 1888, being declared epidemic from November, 1887, to March, 1888.

In Hong Kong it was epidemic in the early part of the year, and a law was passed by the Governor and Council making infant vaccination compulsory. The conclusions of Surgeon P. Mulvany, of the medical staff,<sup>206</sup> "On Successful Vaccination on the Plains during the Hot Season," are as follow:—

(1) "That the vaccine virus, if carefully and judiciously cultivated, does not degenerate by successive human transmissions; (2) that the vaccine virus is as active on the plains during the months of April, May, and June as during the cold weather; (3) that much of the success depends upon the operator and the selection of the pock; (4) that there is no danger of excessive irritation or sloughing at the site of the vesicles; (5) that failure is due to the use of lymph from exhausted vesicles, to dry and decomposed lymph, or to the carelessness of the operator."

#### PNEUMONIA EPIDEMICS.

Of an epidemic of pneumonia occurring at Châlon-sur-Saône, F. Trossat<sup>211</sup> says: "The narrative of this epidemic corroborates the recent communications made by Messrs. Jürgensen, Rosenstirn, Flint, Chaumier, Germain Sée, Lancereaux, Lépine, and H. Roudet, which attributed to pneumonia the character of an infectious epidemic and contagious malady. Experimental science, though not having fully investigated the matter, has established by more than one case the infectious nature of the disease; that this acute inflammation of the lung is due solely to Friedländer's microbe, or rather to the presence of many microbes in the pulmonary cells, according to the investigations of M. S. Perret, as presented to the Société Nationale de Médecine de Lyon. It is not less true that the inflammation of the lungs, outside of the influenza stage, is in certain cases epidemic and contagious."

It is proper to state here that Dr. Baker, of Michigan, has



demonstrated the close connection of the prevalence of pneumonia and low temperatures (see ANNUAL, 1888, vol. v).

An outbreak of pneumonia took place at Middlesborough, England, and Dr. Ballard, <sup>6</sup><sub>Jan. 22</sub> who conducted the government examination, came to the conclusion that the disease was communicable. Of forty-three patients in the general wards of the work-house seventeen died, and there were fifty-eight in the sick-wards received from the outside.

#### TYPHOID FEVER EPIDEMICS.

Epidemics have taken place in Cincinnati, Philadelphia, and other points in the United States, and at Pierrefonds (near Toulouse) and Bordeaux, France, while outbreaks are reported at Dublin Barracks and Glasgow. Dr. Bézy, <sup>160</sup><sub>Jan.</sub> reporting on the Pierrefonds epidemic, draws the following conclusions:—

“The residuum from distilleries of molasses and other impure alcohols, designated under the name of *vinasses*, are a means of developing the typhoid bacillus, and give birth, by their combinations, to gases diffusing an odor infectious and dangerous to the public health. To avoid these inconveniences the proprietors of the works where these operations are carried on should be obliged to disinfect these *vinasses* in vats situated in the interior of the establishment. The trenches which have hitherto received these residues should be carefully disinfected before being cleansed.” He further recommends the placing of these works under strict sanitary supervision, not previously exercised.

E. Masse <sup>70</sup><sub>Dec. 12, 87</sub> reports, regarding the Bordeaux epidemic, which proved fatal in one hundred and sixteen out of eight hundred and ten cases, that the water supply was free from contagium or impurity, and attributed the outbreak to the humid air and high temperature.

E. Mauriac, <sup>188</sup><sub>p. 128</sub> J. Kunstler, <sup>70</sup><sub>p. 22</sub> Levieux, <sup>188</sup><sub>p. 273</sub> and A. Layet, <sup>188</sup><sub>p. 280</sub> of Bordeaux, discussed the epidemic on the same fundamental facts and arrived at the same conclusions.

From the report of Dr. de Pietra Santa, corresponding editor, we learn that the Council of Hygiene of the Department of the Seine, called upon to state its views upon typhoid fever and its rational prevention, has not hesitated to adopt, on the report of Dr. Ollivier, the reigning theories regarding the contamination of potable water, as follows: “The cause of typhoid fever

being a special bacteriogenic bacillus, and the best vehicle for this bacillus being found in potable water, the most logical prophylactic is to insist upon a distribution to all quarters of the city of spring water, pure and assured against any pollution."

Practically, the realization of this view presents many difficulties. Unquestionably the quantity of water now brought to the city would be sufficient for all the needs of alimentation, but, in the first place, on account of its high pressure, it is used in elevators, and then there are houses which are deprived of the water, with its present means of distribution, except for drinking purposes, and the river water is utilized for domestic purposes and the exigencies of the public roads. As for the theory itself of the modern etiology of typhoid fever, they believe it to be too absolute and even dangerous, because it leaves, in the second place, the most frequent causes of the malady: autoinfection by the insalubrity of the house, over-crowding, and personal uncleanness.

In an estimation made at Warsaw of the bacteria in water, it was found that on an average one hundred thousand times more bacteria are found in water than in air. Good water should not contain more than three hundred rod bacteria to the cubic centimetre (0.06 cubic inch). Different results were obtained from the examinations of water from various springs and running streams. Above the city the water contained about three hundred bacteria, in the midst of the town over fifty thousand to the cubic centimetre. Bujwid found no pathogenic micro-organisms whatever. After filtering this same water (sand filters have recently been introduced into Warsaw) the proportion of bacteria diminished from twenty to sixty. Spring water contains a still larger number of micro-organisms. In the discussion which followed the reading of this paper, Barzyci stated that in a village near the city of Rzeozow, having no spring, a peasant living by the creek was affected with typhoid. His linen was washed in the stream. Shortly many of the inhabitants, who obtained their drinking water from the creek and who lived below the house in question, likewise sickened with typhoid, while all living above escaped.

#### YELLOW FEVER.

The epidemiological event of the year in the United States was the prevalence of yellow fever in Florida. Jacksonville soon

became the central point of infection and the scene of the most disastrous panic. The origin of the epidemic was, in brief, as follows: A family named Bolios emigrated in 1887 from Havana, where they had kept a hotel, to Key West, their belongings being brought over by a "tramp" steamer called the "Cochran," no opposition to the debarkation being possible owing to the absence of quarantine. The household effects were stored above a restaurant kept by a family named Baker, the members of which were the first victims to the ensuing local epidemic. A dispensary was established by the Government, which also paid the expenses of the hospital, and a refuge camp at Egmont Key was established, from which no case was communicated. The first cases at Tampa, where the fever was carried by a person named Turk, were kept secret from August to October 21st. Turk was a fruit-smuggler from Key West, regular trade being refused by the steamers from Havana or Key West. He was the first victim. The Government could only conform to the wishes of the Governor of Florida and "aid the Hillsborough County Board of Health," the duty of preventing the spread of the disease being undertaken by the Florida State Protective Association, formed of representatives from each county board, under the presidency of Dr. King Wyley, of Sandford. This body raised the Tampa quarantine prematurely in December, cases lingering all winter, despite most bitter denials. From Tampa the disease spread to Plant City, Manatee, and other places, including Jacksonville, which it is believed to have reached in February. Dr. Guitéras, of the Marine Hospital Service, an acknowledged expert, diagnosed at least two of the thirty cases of "society fever" occurring in that month as yellow fever. Isolated cases continued to be reported and denied until August 16th, and it was declared epidemic on the 26th. It was carried to Decatur, Ala., while all the cases were "under guard," and to Fernandina from Jacksonville, and to Gainesville from Fernandina. While the fever was raging at Key West a bill was prepared by the Surgeon-General of the Marine Hospital Service, at the request of a number of health officers, for the establishment of a State Board of Health, but it was twice rejected by the Florida Legislature on economical grounds, although the Governor of the State used his utmost influence to secure its passage.

## CHOLERA.

Cholera has threatened New York, but no epidemic has appeared outside of its eastern habitats. Passenger steamships brought it to the shores of the United States and a few of the infected people from one of them escaped the quarantine established by the port authorities of New York. But due precautions were taken to disinfect the other passengers' baggage and the ships before allowing any nearer approach.

It prevailed in Calcutta with its accustomed virulence and fatality; in Bombay, in Tonquin, in Assam, in Hong Kong as an epidemic, and in Europe, at Sicily, to a limited extent and carefully concealed.

Dr. Furnell,<sup>1082</sup> late Surgeon-General and Sanitary Commissioner of Madras, states: "I believe that water is the chief means by which cholera is spread, especially in India, and that it is on account of the peculiar treatment water obtains in that country that India is the only country in the world which is subject to such frequently recurring and such terrible epidemics of cholera."

Dr. Furnell means<sup>206</sup><sub>p. 222</sub> by "peculiar treatment" the practice of the natives washing their persons and clothes in the water which they use for drinking. Dr. Furnell is strongly opposed to the theory that cholera is not spread by human intercourse or contaminated water, but is due to local influences. He urges that local authorities set certain tanks and wells aside for drinking purposes, and that it be punishable to bathe or wash clothes or animals at them.

The conditions under which cholera prevails in various parts of the Indian Empire,<sup>6</sup><sub>p. 290</sub> have made many express a doubt as to the fitness of the municipalities for local self-government.

*Etiology of Cholera.*—Dr. von Pettenkofer, of Munich,<sup>1084</sup> has published in Germany a report on cholera, in which he reiterates his well-known view of the non-personal contagion of the disease, holding that the cause is in the soil and drainage. Dr. Cunningham, of Calcutta, has also published a book in which he supports Pettenkofer's views. Sir J. Fayrer<sup>1083</sup> has issued a pamphlet in which he says: "The cholera, which has been in Europe for the past five years, has now apparently died out, or at all events is dormant; but it may reappear again, and wherever it can find a fitting nidus, *i.e.*, the presence of bad local conditions,

all the quarantine and inspection in the world will not keep it out."

*Disinfection of Cholera Dejections in Hospitals.*—Our correspondent in Stockholm, Dr. Eklund, sends a report of the method proposed by Wassitjea, of St. Petersburg, for the disinfection of cholera dejecta, which is based upon the following views: The infectious germ of cholera is a bacterium, and, like all micro-organisms, even those possessing extraordinary powers of resistance, is destroyed by steam at a certain temperature for a certain length of time. As the dejecta of cholera, when presented for disinfection, are in liquid form, it is easy to sterilize them in hermetically closed vessels, capable of sustaining a high pressure, at a temperature of 100° C. (212° F.), after which they can be readily disposed of. The advantages of the method proposed are evident: (1) the steam heated above 100° C. is looked upon as a sure disinfectant; (2) this method guarantees a complete, uniform disinfection of the entire mass. The apparatus for the purpose should include a perfectly closing reservoir of a capacity of from twenty to fifty buckets. The vessels should be constructed so that the liquid can be brought to the boiling point, under a pressure of from two to five atmospheres. The apparatus should be connected with a registration apparatus, showing exactly the amount of pressure and the time during which a certain quantity has been subjected to disinfection. According to these data, Messrs. Krehe and Haniken presented models which were examined and approved. The apparatus by Krehe, which was put on trial in the Alexander Barracks Hospital, is described as follows: The reservoir (containing about fifty buckets) is connected by two tubes with two vessels possessing double walls. The tubes pass into the vessels in such a manner that their ends pass a little beyond the lower surface of the cover. Into each vessel another tube passes nearly to its bottom, and is connected with a tube carrying the excrements to the discharging tubes. Tubes also pass from each vessel to the registration apparatus in the room of the physician conducting the disinfection, and others are connected with the manometer. Steam is carried by a tube into the space between the double walls of the vessels. Besides this, the stop-cocks that open the tubes to permit the excrements to flow from reservoir, as well as the stop-cocks of the outflow tubes from the vessels, are specially

arranged so as to permit the stop-cock to be opened for the inflow of a new quantity for disinfection into the vessel until the discharging tube is closed, and the reverse. Finally, a tube is inserted into the vessel for the purpose of providing samples of the contents of the vessel for bacteriological and other analyses.

Sterilization is conducted as follows: The excrement in the reservoir passes by tubes into vessels which are filled, not up to their edge, but to the point of entrance of the tube. After closing all the stop-cocks, steam is passed into the space between the walls of the vessels, constructed to bear a pressure of seven atmospheres. The liquid having attained its necessary degree of heat, as shown by the manometer, the registration apparatus is set in motion, showing the degree of pressure and the duration of this pressure in the vessel. Disinfection completed, the contents of the vessels are mixed with cold water and then pass into the discharging tubes.

The apparatus is at present at work, and preliminary experiments with pure cultures of Finkler-Prior and other bacilli, as also with excrements of dysenteric and typhoid patients, have shown that this method of disinfection is perfectly effective, inasmuch as it has not only destroyed the bacilli, but also the spores.

#### MEASLES.

V. M. Reichard, of Fairplay, Md., <sup>80</sup><sub>July 16</sub> contributes an interesting account of three distinct epidemics of measles, and deduces the following conclusions: "1. Measles are spread by actual contact with the materies morbi. 2. A case in the stage of incubation may inoculate those who are unprotected. 3. It cannot be carried (as usually meant) by a protected person coming from a case of the disease to a susceptible person. 4. It does not spread through the atmosphere. 5. Strict quarantine will prevent it. In each of the three invasions we have traced all trouble as beginning with a single person."

The mortality in epidemics in Bostom, U. S., and Pont de l'Arche, France, was 5 per cent. of the cases; in Neuchatel, Switzerland, 2 per cent.; and among the Sioux Indians at Crow Creek Agency, Dakota, 6.66 per cent.

Ollivier <sup>158</sup><sub>Oct. 4</sub> draws the following conclusions in a paper read before the Paris Academy of Medicine on measles in infant asylums: "It seems a well-established principle that the sanitary

regulations of schools of all descriptions should be subject to periodical revision. It would be a gross error to give immutability to the rules based on the knowledge possessed in one epoch. These should be constantly modified and enlarged. It is necessary in hygiene, as in therapeutics, that each new idea, when it is precise and definite, should be followed by immediate application."

At the session of the Section of Medical Sciences of the French Association for the Advancement of Science, Montguille<sup>3</sup><sub>Apr. 11</sub> declared that, as the result of his observations of measles at Oran, the mortality was governed by the oscillations of the barometer and thermometer, and that the intensity of solar radiation, the relative humidity of the air, and direction of the wind affected the death-rate from the disease.

#### DIPHTHERIA.

No outbreak of diphtheria during the year has been dignified by designation as an epidemic, but the recorded attacks of the disease have been, almost without exception, traced to defective drainage. J. S. Young<sup>157</sup><sub>May</sub> has tabulated the cases and deaths in the first three months of 1887 and 1888, showing the following totals: 1887, cases three hundred and eighty-three, deaths one hundred and sixty-eight; 1888, cases eight hundred and three, deaths three hundred and twenty-four. At Walthamstow, England,<sup>2</sup><sub>Nov. 17</sub> with a population of forty-one thousand seven hundred and sixty, there were four hundred cases with a proportion of from one death to four or five cases. Infection was spread in several local outbreaks,<sup>2</sup><sub>July 14</sub> by cats kept as pets. Some of these animals contracted the disease from their owners and infected their fellows, who in turn, being fondled by healthy children, conveyed the contagion.

A singular anomaly in the sanitary code<sup>2</sup><sub>Sept. 20</sub> in force in London is pointed out. Owing to the interpretation of a section of the Metropolitan Poor Act the system of isolation organized by the Metropolitan Asylums Board for dealing with other infectious diseases cannot be utilized for checking the spread of diphtheria. Fresh legislation to cover this defect was set in motion.

#### CEREBRO-SPINAL MENINGITIS.

Pio Foà and Bordoni-Uffreduzzi,<sup>58</sup><sub>Apr. 20</sub> of Turin, during a slight epidemic of cerebro-spinal meningitis in 1886, found, from an examination of several cadavers, that the disease had run its course

without any other localization, while in others, as is usually the case, lobar pneumonia had acceded. In all cases bacteriological examination of the exudate showed the presence of a single micro-organism identical with that found in meningitis and in the hepatized pulmonary alveoli. They called it "meningococcus," as being the cause of that severe epidemic disease which is localized exclusively in the meninges of the brain and spinal cord.

Further investigation has shown the identity of the meningococcus with the micro-organism that is the cause of one species of so-called salivary septicæmia in rabbits, and also with that found in the lungs in most of the cases of croupous pneumonia, and therefore to be regarded as the most frequent cause of the pneumonia itself.

The identity of pneumonia and cerebro-spinal meningitis is as yet not generally accepted, because croupous pneumonia, as is believed at present, is caused by several, while cerebro-spinal meningitis is *always* caused by the *same* micro-organism. Hence the name given. It is identical with the micro-organism found by Klebs in the exudate of croupous pneumonia, and by him called "monadina," but introduced by Klebs as *gleococcus*. It is also identical with the microbe of salivary septicæmia of Pasteur, Sternberg, and Klein, and with Fränkel's *diplococcus* of pneumonia. They propose the name "*diplococcus lanceolatus*," because of the form.

The authors next present a brief historical review of the studies in the etiology of cerebro-spinal meningitis, and then pass over to a consideration of the biological properties of the micro-organism, as determined by culture methods.

As to the action of external agencies upon the life of microbes, nothing is added as to the effect of temperature and alkaline reaction of the culture medium, already observed by others.

They investigated the existence of a permanent meningococcus, since sometimes epidemics, occurring in a dwelling or section of a city, lead to the supposition that the infectious germ has been preserved in the soil and thence passed to the atmosphere. It is well known that such epidemics may appear at any season, independently of local temperature. Cultures were, therefore, kept for several days at a low temperature, nearly at zero. Agar-tubes of meningococcus showed no development at 2 or 3° C., but,



if even after remaining at that temperature, they were exposed to one of thirty-five degrees, they developed as vigorously as if the inoculation had been done the same day. Hence, low temperature does not destroy its life, even if applied for a long time.

As to the effect of *drying*, the blood of an infected rabbit, as also agar-agar cultures, were dried in a watch-glass. Inoculation with this material forty-five days after desiccation proved successful. Hence, drying does not destroy the micrococcus, and this is, perhaps, the explanation for certain epidemics, which, as it seems, spread by way of the air.

Their investigations upon man were made with the view not only to discover the kind of micro-organism that might be regarded as cause of the disease, but also to determine the principal anatomical localization. In some cases of epidemic cerebro-spinal meningitis the amount of exudate was so slight as to be recognized only as a slight opacity of the cerebro-spinal fluid at the base of the brain and upper portion of the spinal cord. As a rule, the exudate was more distinct upon the cerebral vault and posterior part of the cord. In these cases the spleen was moderately enlarged and no other localization was present.

When pneumonia was a complication the meningitis was chiefly developed at the cerebral vault, the exudates being greenish and especially copious along the meningeal vessels.

The ordinary croupous pneumonia presented nothing remarkable except serous infiltration of the mediastinum and subpleural connective tissue and sometimes of the mucosa of the respiratory passages, especially in the glottic and the lateral epiglottic ligaments.

There was sometimes pleuritis with empyema, and sometimes pericarditis was superadded. In one case the affected portion of the lung was very small, but there existed a serositic multiple (peritoneal, pleural, or pericardial) produced by the diplococcus. Very frequently the croupous pneumonia was complicated by nephritis acuta, with small, fresh foci of diplococcus. Among other localizations were a few cases of acute polyarthritis, in which the articular cavities presented a purulent exudate with the usual diplococci. Croupous enteritis and colitis were never seen in man as consequences of the pneumonia, but they were developed experimentally. Finally, the interesting fact, abortion in the fourth or sixth month, in consequence of croupous pneumonia in

two pregnant women, where the diplococcus was found in the uterine veins, the foetal placenta, the liver, the blood of the foetus, and in the milk of the women. From all these sources they obtained the characteristic cultures of the diplococcus. The women died, and autopsy showed pneumonia still in the stage of red hepatization. The abortion occurred on the second or third day of the disease.

Finally, the principal fact is that the authors, in cases of cerebro-spinal meningitis *alone*, found in the exudate only the lancet-formed diplococcus. The same thing was observed in all cases of meningitis with pneumonia, and while not rejecting the idea maintained by several authors, that croupous pneumonia might be produced by other micro-organisms, especially the pneumo-bacillus, Friedländer's, they declare that in the cases studied by them with the greatest care from November, 1886, to May, 1887, they found only the diplococcus lanceolatus in the pneumonic exudate. They reaffirm positively that every croupous pneumonia complicating cerebro-spinal meningitis is always carried by the same diplococcus found in the meningeal exudate.

The detailed account of experiments go to show that nearly all the forms of localization seen in man were exactly reproduced in animals by culture inoculations, and that by the development of the pathogenic micro-organism the developments of the phenomena of disease were completely explained.

#### PSEUDO-MEMBRANOUS PHARYNGITIS.

J. M. Cotterill <sup>36</sup><sub>Sept.</sub> read a note before the Edinburgh Medico-Chirurgical Society on a recent epidemic of sore throat and its relation to the milk supply. The epidemic occurred at a large boarding-school near Edinburgh, and was of a peculiar nature. After from two to four days' incubation the pharynx became painful, and on it developed a patch covered with membranes which could easily be rubbed off. This condition lasted from three to five days, and then gradually passed off. The submental glands were not affected, but during convalescence, after the active symptoms had passed off, the glands behind the sterno-mastoid became affected with a hard, brawny swelling. There was never any suppuration, but the swellings were intensely painful, the pain extending to the back of the head and neck. In only one or two cases were there rigors at the outset; in only one case albumen in the urine, and then only

a trace. The epidemic occurred in October, 1886, and recurred in October, 1887, lasting several weeks in both cases. During the first epidemic fifty boys were affected, during the second eighty. Suspecting the milk, Dr. Cotterill caused it to be boiled, with the effect of checking the epidemic at once. After ten days, boiling the milk was discontinued, and within a day or two several new cases appeared. Again the milk was boiled and the disease stopped. The dairy from which the milk came was put into thorough order by direction of the sanitary authorities, and as the epidemic had ceased no more was done. But in October, 1887, the same symptoms occurred in the school. On this occasion the milk was again boiled, and several cows in the dairy, found to be suffering from vesicular disease of the teats, were isolated. This checked the disease at once, only to begin again when the milk was drunk unboiled. As in the former case, the epidemic ceased after several weeks. In these circumstances Dr. Cotterill was sure the disease was caused certainly by the milk, and probably, to some extent at least, by the condition of the cows' teats. A microscopic examination of (1) the throat-membrane, (2) blood from the patients, and (3) secretion from vesicles on cows' teats was made by Dr. G. S. Woodhead, the result being negative.

The following tables are appended, showing the relative prevalence by months of cholera, yellow fever, and small-pox for the year 1888:—

## CHOLERA.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Calcutta* . . . . .	.	.	.	196	.	88	102	34	29			
Chili :												
Santiago †												
Valparaiso ‡												
Provinces of §												
Hong Kong												
Peru ¶												
Philippine Islands:												
Manila . . . . .	.	.	.	.	.	.	.	.	182			
Taytay . . . . .	.	.	.	.	.	.	.	70				
Salta, Argentine Republic.	7											
Venezuela ¶¶												
Singapore . . . . .	.	3										

\* Five hundred and forty-one deaths in January, February, and March.

† Ten to twenty deaths daily to January 31, 1888.

‡ One thousand one hundred and ninety-four deaths (official) } from December 15, 1887, to February 15, 1888.

§ Four thousand deaths (estimated)

¶ Thirty to forty deaths daily (estimated) to January 31, 1888.

¶¶ No reliable data, but cholera ceased by April, 1888.

¶ No reliable data.

## YELLOW FEVER.

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
UNITED STATES :												
Brooklyn, N.Y. . . . .								2		1		
Decatur, Ala.*												
Delaware Breakwater . .							1					
Jackson, Miss. . . . .									2	5		
Louisville, Ky. . . . .									2			
New York.												
U. S. Steamer Boston . .											5	
Cape Charles Quarantine										1		
Florida :												
Camp Perry . . . . .									1		3	
Enterprise . . . . .										5		
Fernandina †										2		
Gainesville . . . . .									1	7	8	
Jacksonville †								28	75	89	50	
Live Oak . . . . .											2	
Macclenny §												
Manatee . . . . .								2				
Palmetto ‖								1	3	4	9	
Plant City . . . . .						1						
Tampa . . . . .								8	1	1	1	
FOREIGN :												
Ceara, Brazil . . . . .		4	5	11	4						1	
Carthagen, Colombia . .									1			
Cayenne.												
Cienfuegos . . . . .	1		1	1	1							
Colon . . . . .								1				
Demerara . . . . .		3										
Guayaquil . . . . .		9	5	10	9	15	5		2			
Havana . . . . .						38	79	88	12	48	38	3
Martinique . . . . .	9	7	14	24	27			2	1			
Merida . . . . .	1											
Pernambuco . . . . .			1	1	2						4	
Port au Prince . . . . .									3			
Rio de Janeiro . . . . .										8	7	
Sagua La Grande . . . .			1					4				
Santiago de Cuba . . . .		6	1	1			29	13	17			
Vera Cruz . . . . .										2		

\* One hundred and thirty-six cases and forty-two deaths during the epidemic.

† One thousand two hundred cases and thirty-eight deaths to November 22d.

‡ Four thousand seven hundred and four cases at Jacksonville; four hundred and twelve deaths.

§ Twenty-one deaths between August 8th and September 11th.

‖ To November 20th, eighty-five cases, eleven deaths.

## SMALL-POX.

CITIES.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<b>ENGLAND :</b>												
Blackburn . . . . .		1	7	1			1					
Bolton . . . . .							1					
Bradford . . . . .							1					
Bristol . . . . .	6	4	5	8	4	1	1					
Cardiff . . . . .											4	
Derby . . . . .						1						
Halifax . . . . .				1								
Huddersfield . . . . .			2									
Hull . . . . .			3	3	2	2	1	1	2		1	
Leeds . . . . .	7	5	1	1	1	1	1					
London . . . . .	1	2		1			1					
Manchester . . . . .		1	8	3	1	4						
Nottingham . . . . .	2	2	3		1	3						
Oldham . . . . .		3	4	2	2	1		3				
Preston . . . . .					21	16	17	4	1	1	1	
Sheffield* . . . . .	116	107	104	32	22	12	4	1			1	
Sunderland . . . . .			1									
<b>UNITED STATES :</b>												
Brooklyn . . . . .				6								
Buffalo . . . . .								11	17			
California, State of . . . . .			15									
Key West . . . . .		2		1								
New York . . . . .								1		1	1	
Nashville, Tenn. . . . .							2					
Philadelphia . . . . .				9			21	10	1			
San Francisco . . . . .	27	9	5	4	2	2	2		2	1		
<b>FOREIGN :</b>												
Acapulco . . . . .								1				
Amsterdam . . . . .											1	
Bordeaux . . . . .	3											
Bremen . . . . .										2		
Buenos Ayres . . . . .		70	78			70						
Calcutta . . . . .		1	1				3	4	3			
Catania, Italy† . . . . .			6	18	53		87	120	134	153	118	
Cienfuegos . . . . .	107	154	81	47	19	10						
Genoa . . . . .	26	36	26	11	4	2	6	6	6	3	12	
Gibraltar . . . . .									1		1	
Glasgow . . . . .	1											
Guayaquil . . . . .	71	50	11	8	6	3	1		13		3	
Havana . . . . .	269	140	85	55	29	18	11	2	2			
Havre . . . . .	10	15	22	7	19	12	7	1	1	3	5	
Hong Kong‡ . . . . .												
Maceio, Brazil . . . . .							1		2	3		
Marseilles . . . . .		12	7	10	14	8		9	4	6	14	
Martinique . . . . .			254		35	28	57	29		4		
Mataanzas . . . . .								3				
Montevideo, Uruguay . . . . .	20		39		50		33	33	25			
Munich . . . . .		1	1									
Palermo . . . . .							2		4	3	9	
Paris . . . . .	31	34	27	24	29	9	10	5	10	9	20	

\* There were two hundred and seventy-eight deaths from small-pox in 1837.

† Six hundred and seventy-nine in 1837.

‡ No reliable data.

## SMALL-POX—(Continued).

CITIES.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
FOREIGN :												
Pernambuco . . . . .										4		
Rheims . . . . .	2			1		1				3		
Rio Janeiro . . . . .										1		
Rome . . . . .	17	6	3	8	6	1						
Singapore . . . . .		8										
Sagua La Grande . . . . .	8	18	28	5	3	2						
Santiago de Cuba . . . . .			1*									
Trieste . . . . .	20	14	13	2	6	14	19	18	23	19	11	
Trapani, Italy . . . . .								124	195	332		
Vera Cruz . . . . .									3	4	1	
Warsaw . . . . .	11	41	27	6	22	27	33	16	21	17	30	

\* Disappeared at this date.

During quarter ended March 31 there were 583 deaths from small-pox in England and Wales.—Abstract, No. 20.

## HISTOLOGY AND TECHNOLOGY.

BY WALTER P. MANTON, M.D., F.R.M.S.,  
DETROIT.

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### HISTOLOGY.

FROM the investigations of tattooed skin by Variot and Moreau,<sup>3</sup> we learn that the blue appearance of the skin after the use of Chinese ink or lamp-black is due to the fact that the color-particles are seen through the transparent epidermis and a portion of the derma. In recent tattooing the colored particles are diffused through the derma, while in the old the color is found fixed in the adventitious coats of the vessels. The permanency of the effect is due to the stability of carbon. In red tattooing the effect is produced by viewing the brownish-black particles by transmitted light.

*Club-shaped Nucleoli.*—Lukjanow<sup>29</sup> has found, in the mucous membrane of the stomachs of salamanders, animals, and man, peculiar nucleoli, which he calls *nucleoli claviformis*. These club-shaped forms are seen in nuclei, together with spherical nucleoli, as long, irregularly shaped bodies, some of which approach and even penetrate the nuclear membrane. The principal importance attached to these bodies is that they go to prove the nucleus as an independent morphological element, and that it is not a semi-fluid, unformed mass. He, therefore, thinks that they deserve to be placed in a special category as elements *sui generis*.

*Blood.*—According to Boccardi<sup>126</sup> the reproduction of red globules by karyokinesis in the blood of healthy animals is very rare, as already stated by Bizozzero and Torre, and that after extensive loss of blood the increase by this means is limited. In the plaques, a remarkable arrangement of the chromatic substance of the nucleus was noted—the fibres of the reticulum being large, and arranged on either side of the nuclear apsis.

*Ossification.*—Leser<sup>29</sup> finds that the formation of cells in the epiphysial cartilage takes place as in other tissues, a series of

( H-1 )

typical changes in the cell-nucleus finally resulting in its division, followed by that of the cell (Fig. 1). The product of this proliferation is a large number of cells, to the arrangement of which, in columns, is due the long growth of the bone. Mitosis, to a slight degree, takes place in this portion. In the vicinity of the medullary space the protoplasm of the newly-formed cells becomes pale, appears dropsical, and the nucleus, finally losing (?) its contents, appears like a vesicle. Very near to the border of ossification, and at times in the midst of it, many of the large cartilage cavities



FIG. 1.—TYPICAL CHANGES IN CELL-NUCLEUS.  
(*Archiv. für Mikrosk. Anatomie.*)

appear to be quite empty, while others are partially filled with the remains of the protoplasmic cell-substance (Fig. 2). In the cells of this region there is no trace of the karyokinetic figures. Into these partially empty, partially cell-filled, spaces the blood-vessels soon penetrate, and circulation is established with the vessels of the medullary space. This is immediately followed by the appearance of large cells, which are distinctly granular and of the most varied form (Fig. 3). These cells, which originate in the marrow and are identical with Gegenbaeur's osteoblasts, fill out the empty spaces.



*The Hair and its Follicle.*—The recent researches of Mertsching<sup>29</sup> throw new light on the histological arrangement of the hair and follicle, which differs materially from the heretofore accepted plan. He finds that the deepest cell-layer of the epidermis, the so-called basal cells of the root-sheath, is a continuation of a closed cylinder which covers the entire surface of the papilla to the apex, and that the cells of the medulla are a direct continuation of the basal cells. Differing from Unna, he describes the hyaline membrane or layer as present along the whole length of the follicle from the boundary

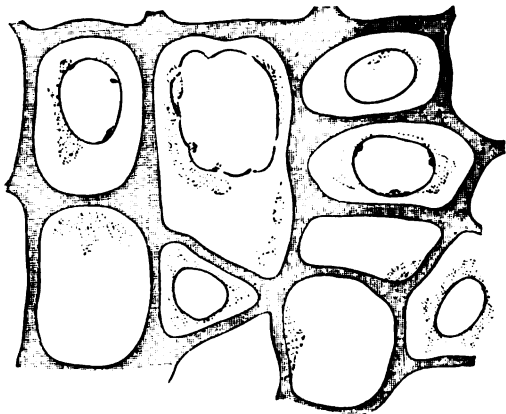


FIG. 2.—APPEARANCE OF LARGE CARTILAGE CAVITIES.  
(Archiv. für Mikrosk. Anatomie.)

between epidermis and chorium, to and over the papilla to the apex. The form of the papilla is very constant, appearing like a knob drawn out to a fine point. In longi- and trans-sections the inner surface of the hyaline layer very often appears finely serrated, and the cylindrical basal cells of the external root-sheath also have similar shallow dentations, giving the appearance of a dovetailing of the two layers. The bases of the cylindrical cells elongate into thread-like processes which, instead of continuing straight, bend and run in the plane of the hyaline membrane until they sink into and unite with this structure, thus making the layer appear as if constituted of these intertwining filaments. Kupffer designates these thread-like prolongations "epithelial cell-roots." These roots appear under two conditions; either they are given off from the cylinder cells as a single thick thread, which then appears

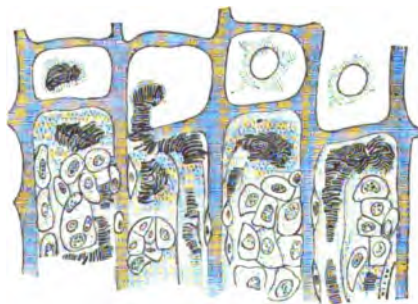


FIG. 3.—GRANULAR CELLS.  
(Archiv. für Mikrosk. Anatomie.)

marked with fibrillæ, or the cells send out from their bases several delicate filaments, all of which, as a rule, run in the same direction to the hyaline membrane. It is possible that the thicker roots are only the result of the adhesion of numerous fine root-filaments, but, however this may be, the cylinder cells of the root-sheath and the hyaline layer are associated structures. In this connection it is interesting to note that nuclei also appear in the membrane.

#### EXPLANATION OF PLATES.

(Contribution to the Histology of the Hair, etc., by Mertsching.)

FIG. 1.—Longisection through hair and follicle, human scalp: *a*, longitudinal fibrous layer of follicle; *b*, circular fibrous layer of follicle; *c*, hyaline membrane showing two layers. The boundary between the hyaline layer and the external root-sheath appears serrated. *d*, hair-papilla. The hyaline membrane is here shown to take part in the structure of the papilla. *e*, external root-sheath of hair showing the two cell layers, *e'*, the external, *e''*, the internal; *f*, non-nucleated layer of Henle, in its lower portion a few scattering nuclei; *g*, Huxley's layer of the inner root-sheath; *h*, cuticula of root-sheath; *k*, cuticula of hair; *l*, spindle-form corticle cells developing the hair-fibres of Waldeyer; *m*, medulla of hair, appearing as the continuation of the cylindrical cells covering the papilla.

FIG. 2.—Hair of guinea-pig, stained by Norris-Shakespeare method; *c*, hyaline layer of hair-follicle; *e*, external root-sheath; *f*, Henley's, *g*, Huxley's, layers of inner root-sheath; *i*, cortex, *m*, medulla, of the hair; *n*, point of union of stratum corium and stratum lucidum.

FIG. 3.—Transsection human hair (head) in middle third of hair-follicle, letters as in Fig. 1.

FIG. 4.—Longisection in axis of hair and papilla (guinea-pig), letters as in Fig. 1.

FIG. 5.—Longisection of hair-follicle and external root-sheath; *e*, external root-sheath; *a*, ring-fibre; *c*, hyaline membrane; *b*, long fibres; layer of hair-follicle.

FIG. 6.—Human hair (head); *a*, external, *b*, internal, layer of hair-follicle; *c*, internal, *c'*, external, layer of hyaline membrane; *e*, epithelial cells extending into root-fibres, *w*.

FIG. 7.—Section through canal of sweat-gland, human axilla; *e*, gland-cells continuing as root-fibres, *w*, which are lost in the tunica propria (limitans) of the gland.

FIG. 8.—Longisection through Henle's layer.

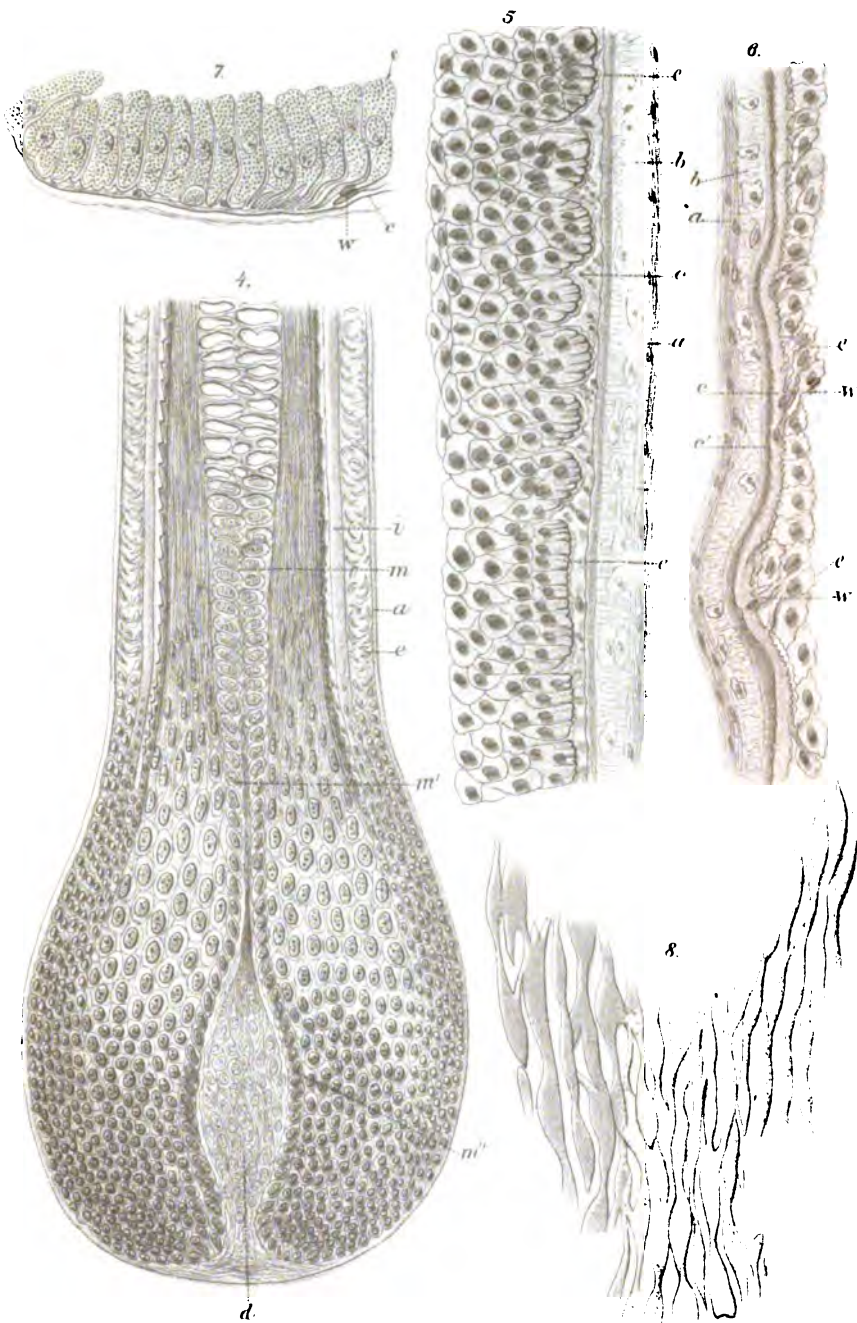
The external root-sheath. Here three layers are seen, the first extending from the follicular opening to the entrance of the sebaceous duct, the middle from this point to the summit of the papilla, and the third from the bottom of the follicle to the base of the papilla. The middle region is the most strongly developed, the cells, as a rule, being larger than those in the superior region. In the lower region the root-sheath loses its polygonal cells and is reduced to two cell-rows, an external and an inner. The cylindrical cells are also shortened in this region, becoming cuboid, and



Andy for Mike's people's interests







Dunkel & Riende, Lith. Plala

Histology of the Hair. Merzding.  
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the hyaline membrane is decidedly thinner. Before this layer has reached the base of the papilla, however, the cells begin to elongate and widen, and become well-developed cylindrical cells, which overlay the neck and body of the papilla. The second layer of the external root-sheath consists of flattened cells. In longitudinal sections through the hair and follicle the following relations exist between the external root-sheath and the *bulbus pili*; after the root-sheath is reduced to two layers,  $e'$  and  $e''$ , the two continue into the bulb (Knob), the external layer,  $e'$ , into the cylindrical cells of the surface of the papilla, the internal layer,  $e''$ , into the thicker layer of cells, which may be designated as the matrix of the cortical layer of the hair. Those layers which farther up correspond to the two layers of the inner root-sheath and the cuticula (Henle's and Huxley's layers) do not reach the papillary surface at all, but turn before gaining that point.

The medullary substance. The same layer of cylindrical cells which forms the under layer of the epidermis overlays the surface of the hair-papilla. Along the drawn-out apex of the crown of this, the cylindrical vasal cells are continued, and, as they usually appear at right angles to the supporting connective-tissue layer, they also appear at right angles to this. From this it is evident why the medullary cells are arranged transversely to the axis of the hair. The medullary cells are, therefore, homologous to the basal cells of the epidermis.

The cortical substance, the cuticula, and the inner root-sheath. In the two-layer portion of the external root-sheath,  $e'$  and  $e''$ , the external layer,  $e'$ , continues into the basal cylinder cells which farther up form the medullary cells, the inner layer,  $e''$ , turns to the thicker cell mass which forms the principal portion of the *bulbus pili*, and from which the corticle cells are developed. In very thin axis sections (one two-hundredth millimetre) other layers are seen which turn at the level of the neck of the papilla and proceed upward. If these layers are followed from above downward to the lower portion of the hair-follicle, the clear, non-nucleated layer of Henle is seen in the inner root-sheath (Fig. 1, *f*). Toward the apex of the papilla scattering nuclei may be discovered, and farther below the layer is seen to be made up of cubical nucleated cells. As such they turn to overlay the *bulbus pili*, without at first changing their form, but at the crown of the

papilla they begin to lose their nuclei and to take on the characteristics of the hair-cuticle. The inner root-sheath is, therefore, not to be considered as part of the hair, but as part of the epidermis of the hair-follicle; the two cuticulæ, however, belong to the hair.

*A New Fat-forming Cell.*—Two years ago Zawarykin, of St. Petersburg, discovered in the subcutaneous connective tissue of a white rat a peculiar spherical cell, which has since been investigated by Poljakoff.<sup>29</sup> These cells closely resemble embryonal cells, being about one and one-half to two times as large as lymph-corpuscles, and have a comparatively large globular nucleus, containing several nucleoli. The nucleus is surrounded by a transparent layer of protoplasm, which is quite free from granular matter, and which is distinguished by its marked powers of refraction and its feeble staining qualities, while the nucleus itself is readily colored (Fig. I, 1). These cells are seen in all parts of the body where is loose connective tissue, as in the loose subcutaneous connective tissue, the great omentum, etc., but particularly in those parts where collections of fat are present. Observed under the varying conditions of nutrition—complete, moderate, insufficient, and starvation—and in animals of different ages, it was found that these spherical cells are exceedingly sensitive to the state of body nutrition. Under certain conditions they enlarge, through an increase of their protoplasm, until they acquire a diameter of from two to six times that of a leucocyte (Fig. I, 2–11), the nucleus undergoing changes at the same time. The previously visible nucleoli become invisible, and an indirect division of the nucleus takes place, followed by a division of the protoplasm, which arranges itself around each newly formed nucleus (Fig. I, 5, 13). In this way the spherical cells divide into two daughter-cells, some having from three to seven nuclei, each with one or more nucleoli, the protoplasm forming a layer around each nucleus, with a common layer enveloping the whole. The external layer then becomes thinner, and the daughter-cells appear as distinct segments of the mother-cell, until, the connecting protoplasm disappearing, they are set free as independent entities. In many instances the protoplasm of the spherical cell undergoes a granular change before division takes place, the granules varying in size from almost invisible particles to globules which may be seen lying at the periphery of the protoplasm. These glistening granules diminish with advancing



segmentation, and arrange themselves along the borders of the constricted off protoplasm. The granular appearance is caused by the presence of shining fat-molecules, some of which unite to form the large globules. This fat, which at first appears to serve as nutriment to the dividing cells, at a late period becomes distributed along the line of the protoplasmic division, and thus facilitates the constricting off of the daughter-cells. The elasticity of these cells appears to be greater than that of the white blood-corpuscles, for they assume the most varied forms under different conditions. Thus, while they are spherical in the wide meshes of the subcutaneous connective tissue, between the connective-tissue fibres they are more ovoid in shape, the nucleus appearing ellipsoidal.

These spherical cells also possess the power of amoeboid movement (Fig. IV), and from their presence in and around the blood-vessels it appears that they are capable of penetrating the vessel-wall in the same manner as the leucocytes. Under the influence of increased nutrition the protoplasm of the spherical cell becomes granular, and takes on a yellowish stain with picrocarmine (Fig. I, 16-18), whereas before it is quite or almost uninfluenced by the dye (Fig. I, 14-15). Gradually the granular appearance increases, but still remains feebly lustrous, thus being distinguished from the fatty molecules, which now develop (Fig. I, 19), and by degrees displace the former. As these molecules are disposed throughout the protoplasm, and their coalescence into drops is not immediate, fat-globules of various sizes may be seen occurring at the same time in the spherical cells (Fig. I, 20-22). From the above observations we may infer that this is a definite, physiological process, consisting in the elaboration of fat in the protoplasm of the spherical cell, from the albuminous food-material carried to them by the blood. In all probability the spherical cells produce a material which in chemical composition is closely allied to fat, but is not fat, from which at a later period fat is formed. The gradual appearance of fat in the cell, however, is not always to be observed, for sometimes it is noticed that the fat is at once formed in the protoplasm.

#### DESCRIPTION OF PLATES I TO III.

(Poljakoff's New Fat-forming Medium.)

Fig. I.—1, Spheroidal cells of loose connective tissue; 2-15, cells enlarging from increase of protoplasm; 6-13, cells in various stages of division; 18-23, cells in

process of fat formation; *mG*, pale granules; *fG*, shining fat-granules; 23-29, formation and constricting off of the pale globules. (Subcutaneous cellular tissue of white rat.)

Fig. II.—1-4, lamelliform cells of Ranvier, some slightly rounded (3-4); disk-form of nucleus, with collection of its substance toward the periphery (5-7), giving rise to a ring-like nucleus; *ps*, protoplasm; 11-13, nuclei, with diminishing visible protoplasm, which increases later, with formation of fat-molecules (*FM*); 14-20, sections of dividing nuclei; 21-28, appearance of half of divided nucleus. (Source as above.)

Fig. III.—1-11, nuclear division; 12-13, misshaped, undeveloped nuclei in form of half-rings; 14, spherical fat-forming cell converted into a young fat-cell, which in 15 is fully developed, having protoplasmic processes; 16, fat-cell without processes. (Source as above.)

Fig. IV.—Spherical cells during amoeboid movement. (From a vessel in fat-tissue.)

Fig. V.—1, spherical cell in process of division; 2, the same with process; 3, the same with fat-molecules (*FM*); 4, the same with newly-formed protoplasm (*np*), the residue of the granular protoplasm containing fat-molecules. (From a vessel in fat-tissue.)

Fig. VI.—Vessel and branch from subcutaneous cellular tissue (*bFz*); round cells undistinguishable from the spherical fat-forming cells (*fFz*). (From subcutaneous cellular tissue of white rat.)

Fig. VII.—Small vessel breaking up into young capillaries, which consist of chains of spherical cells, in the protoplasm of which red blood-corpuscles may be seen (*rK*); in the meshes of the capillaries are many spherical fat-forming cells, some in motion (*bFz*), others fixed (*fFz*). (Source as above.)

Fig. VIII.—A capillary net, in the meshes of which are fat-cells beginning to atrophy (*bFz*) and leucocytes (4). (As above.)

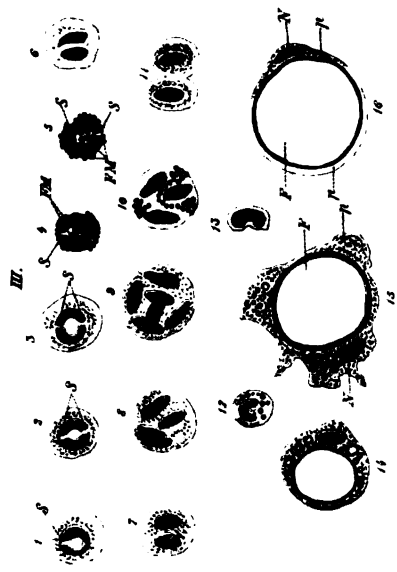
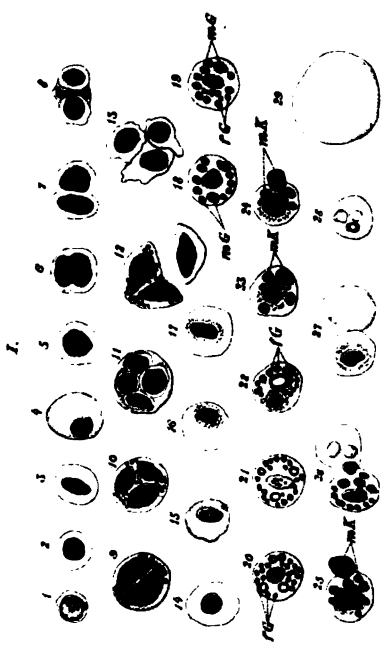
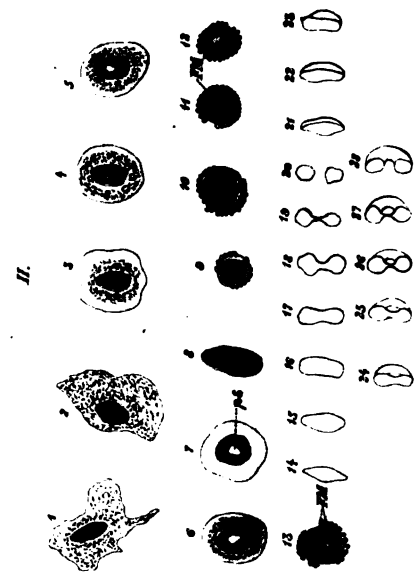
Fig. IX.—Advanced atrophy of fat-cells, showing final result—granular cell in *gz*. (As above.)

Fig. X.—The cells having lost part of their fat, the vacuoles (*V*) are filled with a serous fluid. (Fat capsule of kidney.)

Fig. XI.—The cells after serous atrophy appear at the period of regeneration as giant cells, their contents consisting of a firm material (1), which is granulated, the remains of the old protoplasm (*ap*, 1), which is surrounded by an opalescent fluid. In other cells (2) the contour of the protoplasm is less distinct, having a granular appearance (3) and in which the nuclear division begins; atrophied cell (5). (Same as above.)

Fig. XII.—Advanced stage of nuclear division (1); beginning separation of the protoplasm around each cell (2), each division of the cell being seen in (3), with the common envelope; fully formed cell (4). (Mesentery of white rat.)

*The Smooth Muscular Fibres in the Mucosa of Small Intestine.*—Kultschitzky<sup>29</sup><sub>M.S.B.1</sub> has recently re-investigated this subject, and his results differ quite materially from those of other observers, notably those of Spee, whose investigations may be taken as the most reliable up to this time. Kultschitzky finds that certain muscular bundles from all three layers of the muscularis mucosæ are destined for the mucous membrane. At first these bundles run diagonally upward, extending to a rather thick layer of the basement tissue just below the glands of Lieberkühn. From this



# A New Fat-Forming Cell. (Poljakoff.)

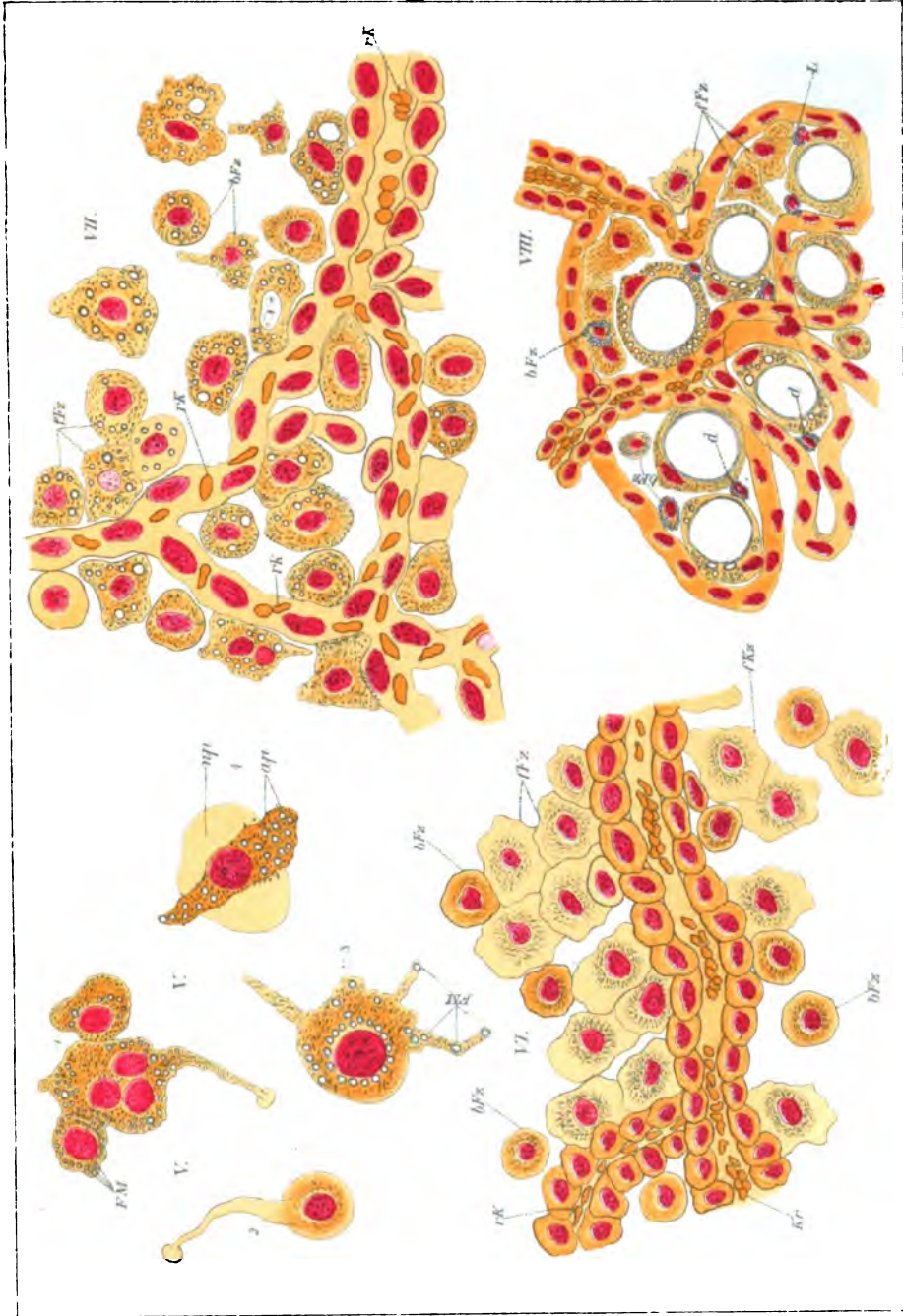
*David A. McFarquhar, Lark Mill.*

Archiv für Musikwissenschaft.

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From "A New Fat-Forming Cell" Plate

# A New Fat-Forming Cell.









point the fibre-bundles proceed parallel to the long axis of the glands until they reach the villi, when they converge and extend along the central canal of each villus, forming an almost unbroken muscle layer around the lacteal vessel. As they stretch upward these bundles give off branches which also run obliquely upward toward the periphery of the villus until they reach the epithelium, to the under surface of which they become attached. As the result of this branching the fibre-bundles become much lessened in size, a portion, however, remaining to reach the apex of the villus, where it spreads out, brush-like, reaching and uniting with the lower surface of the epithelium. The part played by those muscle-bundles running parallel to the axis of the villus is, by their contraction, to shorten the villus, while the bundles running obliquely serve, in contracting, to widen the central canal. Thus it is seen that during the whole period of villous contraction the central canal remains open and the flow of chyle is unimpeded. (See Figs. 4, 5, and 6.)

*Regeneration of Cross-Striped Muscle-Bundles.—*

From a series of interesting experiments Leven<sup>90</sup> arrived at the following conclusions as to the regeneration of cross-striped muscle: At first there appears in some parts a faint dimming of the striæ, a slight differentiation of the contractile substance, and a very great increase in the number of nuclei; then suddenly, as the sarcolemma sheath vanishes, an extraordinary proliferation of nuclei and the muscle-bundle become a mass of muscle-cells. Besides muscle-cells and their protoplasmic coats, there are now visible the so-called ribbon-

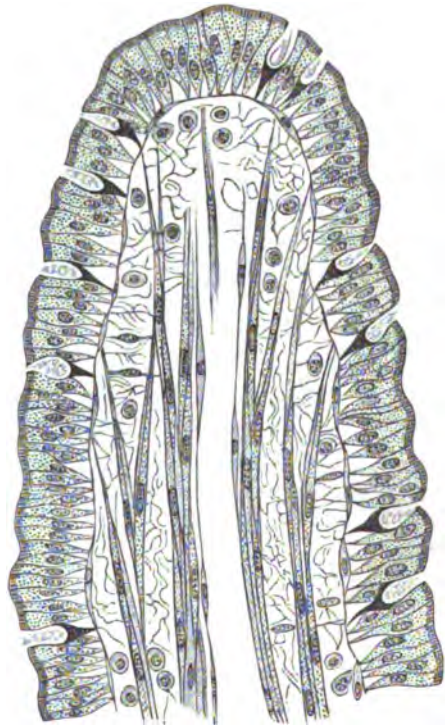


FIG. 4.—SMOOTH MUSCULAR FIBRES IN MUCOSA OF SMALL INTESTINE.  
(Archiv. für Mikrosk. Anatomie.)

shaped plates, which behave just as the regenerating muscle-bundle behaves, only they have less energy of proliferation and their stages are, consequently, slower. The remaining steps before the new muscle becomes fully formed are not satisfactorily settled. In about ten days the muscle-cells appear arranged in rows, with delicate threads knitting their pointed extremities, these threads

being probably direct and indirect derivatives of a muscle-cell, each cell having its own set. The growth of these threads and their union cross-junction with others gives the new muscle-bundle. Leven admits that he is not quite certain of this, but he thinks this view more probable than Waldeyer's, who holds that the new bundle is formed from the increase in length and breadth of the muscle-cells. In the bundle, presumably formed as described, faint cross-striæ are visible toward the end of the fourth week, and at about the same time the sarcolemma sheath can be made out. The nuclei, which at first lay in the cell-centres, find their way, as the muscle grows, to the periphery. At this time there are no karyokinetic figures within the muscle-bundle.

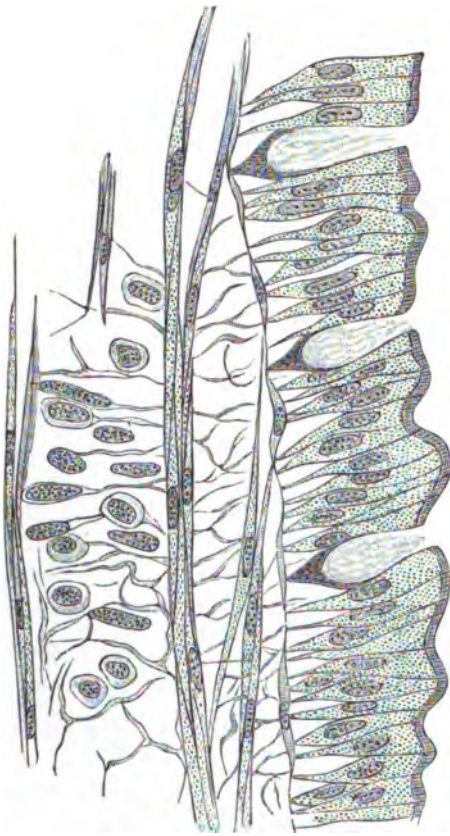


FIG. 5.—SMOOTH MUSCULAR FIBRES IN MUCOSA OF SMALL INTESTINE.  
(*Archiv. für Mikrosk. Anatomie.*)

*Secreting Cells of the Small Intestine Epithelium.*—According to Paneth,<sup>29</sup> the goblet-cells of the epithelium of the small intestine take their origin from ordinary epithelium. The secretion appears first in a granular form; a portion of the protoplasm and the nucleus remain, but also undergo certain changes. If a reticulum is found in the thlicka of the goblet-cells, it is not of a protoplasmic

nature, but consists of secretion. As soon as the goblet-cell becomes emptied it again resumes the form of an epithelial cell. In the crypts of various mammals a peculiar variety of secreting cells is found; these resemble neither goblet-cells, mucus-cells, nor pancreas-cells. They are situated at the fundus of the crypts and are filled with granules often of considerable size.

*Artificial Production of Decidua-like Cells.*—Calderini<sup>739</sup><sub>No.4</sub> has been able to produce, by means of local irritation, a proliferation

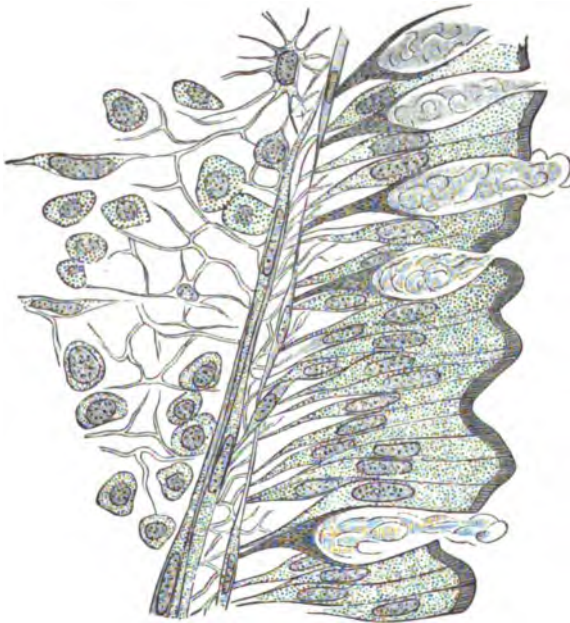


FIG. 6.—SMOOTH MUSCULAR FIBRES IN MUCOSA OF SMALL INTESTINE.  
(Archiv. für Mikrosk. Anatomie.)

of the endometrium cells, which bear a close resemblance to those of the decidua.

*Histology of the Uterus.*—The interesting investigations of Blanc<sup>25</sup><sub>July 20</sub> in uterine histology show that the inferior segment is covered by a decidua identical with that of the superior parts of the body of the organ. In most instances the ovum adheres intimately to the lining of this same segment, and then the decidua is always perfect. At this level the transformation of the mucous membrane of the body into decidua is very rarely incomplete, hence it follows that the adhesion of the membrane is feeble, or

even completely defective. This also leads to the conclusion that the inferior segment is constituted of the body of the uterus; even where the transformation is incomplete the character of the glands forbids its being considered as belonging to the cervix. The mucous membrane of the neck may be more or less modified without any alteration taking place comparable to a transformation into decidua.

*Axis-, Cylinder-, and Nerve- Cells.*—Jakimovitch,<sup>165</sup> has studied the axis-, cylinder-, and nerve- cells, and concludes that the two are morphologically the same, the latter being only an enlargement of the former with a nucleus. They are composed of fine fibrils, between which is found an intermediary substance, the nature of which has not been determined. The primitive fibrils differ in their physical and chemical qualities, the one being thicker, more elastic, and solid than the other, and staining deep brown with nitrate of silver, while the second remains clear and unaffected. These two substances are so arranged that they alternate, giving the appearance of striated muscular tissue. By prolonged soaking in acidulated water they may be separated, the fibrils being reduced to dark, nervous particles. During repose these nervous particles give rise to a granular appearance, but in action the striated look becomes apparent. This striation is not an artificial production, but represents the true nature of the fibrils.

*Vacuole Formation in Nerve-Cells.*—From a review of the literature of the subject, Aufisnow<sup>21</sup> finds it generally stated that the conditions for vacuole formation are present in the peculiar structure of the cells, from which, under pathological conditions, the vacuoles, as usually understood, are developed. There are in the life of certain cells (epithelium, etc.) and in unicellular free organisms (monera) moments when the vacuole formation appears to be the physiological result of internal activity. From his own studies, Aufisnow concludes that the patho-anatomical origin of the vacuoles is no longer to be doubted.

#### TECHNOLOGY.

During the past year two interesting old microscopes have been discovered at Economy, Penna., by Mr. Henrici.<sup>440</sup> One of these, a modification of a form introduced by Marshall in 1704, was, according to a written inscription inside the drawer, once the prop-

erty of the famous botanist, Linnæus. The other is of the Culpepper type, and is almost the counterpart of an instrument figured by Adams in 1787.

*Apochromatic Objectives.*—One great drawback to the use of these new glass objectives is that a compensating eye-piece is indispensable. To obviate this, Gundlach,<sup>440</sup><sub>p. 42, 1</sub> has worked out a new formula which gives excellent results with the ordinary ocular.

*Automatic Mica Stage.*—This piece of apparatus, as described by Edmonds,<sup>400</sup><sub>p. 6</sub> consists of a flat box or case forming a loose stage, which is intended to be laid upon the permanent stage of the microscope. The automatic rotation is affected by a specially constructed train of wheel-work, which, on being wound up, continues in action for an hour, and when set in motion requires no further attention.

*Camera Lucida.*—Thoma,<sup>401</sup><sub>p. 92, 1</sub> has invented this instrument to overcome the difficulty experienced with those now in use in working with low powers, one to six diameters.

*Minot's Microtome.*—In this instrument<sup>440</sup><sub>p. 104</sub> the knife is stationary while the object is moved. Motion is communicated either by a crank or by a belt to a balance-wheel from a water motor. Each revolution of the shaft raises and lowers the object-carrier, the sections being cut on the downward stroke. The object-carrier is advanced toward the knife when at its extreme height by means of a micrometer-screw placed between the ways on which it runs. This screw has threads one-half millimetre apart, and the large wheel which turns the screw bears three hundred teeth upon its margin. The wheel is turned by means of a pall which strikes a slender upright, while a set-screw allows the pall to engage from one to twelve teeth at a revolution. Thus the instrument has the capacity of cutting sections from one twenty-fifth millimetre to one three-hundredth millimetre as desired. The object is imbedded in paraffin, is soldered with the same material to one of the section holders, and this is then placed in its proper socket and clamped. This part of the apparatus is provided with proper clamps and set-screws, so that motion is possible in the three directions of space, allowing the most perfect orientation of the specimen.

*Planishers.*—Reynolds<sup>440</sup><sub>p. 104</sub> has devised a very simple and useful section smoother which can be made and attached to the knife in

a few minutes. Another still simpler planisher is suggested by Bumpus.<sup>1186</sup> This consists of an ordinary brass pin with the head and point cut off. It is then fixed parallel to the edge of the knife by pressing its ends into two small pellets of bees-wax. The proper elevation for the pin is to be determined by testing on waste paraffin.

*Kolossov's Modified Osmic Acid and Gold Chloride Methods.*—This writer<sup>401</sup> finds that a 0.5 per cent. of osmic acid to which is added a 2 to 3 per cent. solution of the uranium salts easily penetrates the tissues, which may be left in it for forty-eight hours without becoming brittle. When the gold chloride is used the object is saturated for two to three hours in the chloride solution made acid with 1 per cent. hydrochloric acid (one hundred to one). It is then slightly washed in water in the dark, and reduced for two or three days in a weak chromic acid solution (one-fiftieth to one-hundredth). If at the end of this time reduction is not perfected, it will be completed when the specimen is cleared in clove-oil. The more completely the chromic acid is washed out of the tissues, the clearer will be the microscopic picture.

*A New Hardening Method.*—Carl Benda<sup>41</sup> has published a method of hardening tissues which is particularly applicable to the central nervous system, and which possesses certain advantages over the usual methods, in that it preserves the nucleus and protoplasmic structures in a manner similar to that of Flemming's solution, saturates readily large organs (Flemming's solution has but a feeble power of penetration), hardens specimens for cutting in a few days, and does not interfere with any of the usual methods of staining. The material is first placed for twenty-four to forty-eight hours, according to size, in a 10 per cent. aqueous solution of officinal nitric acid, and then, without washing, into the following:—

Cold saturated solution of bichromate of potassium,	1 vol.
Water,	2 vols.

After several hours this solution is renewed, the strength of the bichromate being increased up to equal parts (one to one). In the case of most organs the process is completed in two days; but with brain-tissue or spinal cord it is desirable to lengthen the hardening period to eight days.

*Injecting Apparatus.*—Borden's apparatus<sup>280</sup> consists of a tin



box or bath with a shelf for holding the object running two-thirds its length. A Gage injecting jar occupies the space at the end of the shelf and is connected with a manometer outside. Pressure is obtained by a double bulb. A thermometer enters the opposite end of the box, and heat is obtained by means of a spirit-lamp.

*Injecting Mass.*—On account of the failures which so often result from the employment of the ordinary gelatin injecting mass, Miller<sup>40</sup> recommends a mixture consisting of one ounce of clear French gelatin, soaked in ten ounces of cold water for one hour, and then melted over a water bath and strained through moistened flannel into a flask. While the gelatin is still warm it should be equally divided into another flask. To the first portion two grains of table-salt are added, in the second ten grains of nitrate of silver are dissolved. The two portions are then mixed and shaken thoroughly for three to five minutes, when ten grains of citric acid are added, and the mass kept warm until this is dissolved. This mass will keep, but the results are better if it is used while fresh. Injected sections when mounted have a beautiful purple color, and are perfectly translucent.

Another mass, indorsed by Taguchi<sup>29</sup> for cold injections, consists of a good quality of Japanese ink rubbed up with water until a drop of the fluid on a blotter gives a good black spot without a surrounding gray ring. The injecting must be continued until the specimen is quite black—when the tissue should be cut up into small pieces and placed in a hardening fluid. Until these pieces are thoroughly hardened, they should not come in contact with water, lest the ink be dissolved, and, penetrating the vessels, stain the surrounding tissues. The injected specimen may be stained by any desired process. The advantage of this method is that the mass does not drop out when the specimen is sectioned, and the particles of carbon do not affect the tissues outside the vessel-walls.

*Imbedding.*—Krause<sup>54</sup> places the hardened tissue for ten days in 95 per cent. alcohol, to which a small amount of chlorate of calcium has been added, then in pure turpentine-oil for eight days. From this it is dried on a filter and placed in melted paraffin at 50° C. (122° F.) for another eight days, and finally placed on thick filter-paper in the oven for two days. This method works well with brain-tissue, the white matter being clearly differentiated from

the gray. Benzine or petroleum may be used instead of the turpentine. The surface to be examined must be placed downward on the filter-paper, otherwise the results are not satisfactory. Instead of paraffin, Blackburn<sup>402</sup> uses the so-called "Japan wax" for infiltrating tissues, and finds that it answers admirably in every point. Specimens which have been imbedded in celloidine are often preserved for future cutting, the variety of the tissue being written on a label or on the paper which surrounds the cast. Apáthy<sup>401</sup> has shown, however, that if the desired note is written with a soft pencil on the bottom of the cell in which the object is imbedded, after hardening in 70 to 80 per cent. alcohol, and removing the paper, the writing will be found transferred to the celloidine, and may be preserved by giving it a coating of the same material in solution.

*Large Lung Sections.*—Woodhead<sup>2</sup> gives a method which proves satisfactory. Slices of lung-tissue are thoroughly hardened in Müller's fluid or alcohol, washed in water until the hardening agent has been removed, and placed in a mixture of five parts of mucilage (B. P.) and four parts of a syrup made by boiling twenty ounces of sugar in a pint of water. In winter three parts only of syrup may be necessary. The tissue should be soaked in this for forty-eight hours, but may be left as long as a month without injury. When ready for cutting, the lung is taken from the mixture and carefully dried with a soft, clean cloth, and then placed in B. P. mucilage until the surface is thoroughly saturated—ten minutes is sufficient. It is then placed on the freezing-plate of the microtome, upon which a very thin layer of gum has been spread. After cutting the sections are floated on to the slide, which is placed in a dish of slightly warmed water, gum and syrup soaked out, and sections stained and mounted in glycerine jelly. Unstained specimens may be cleared in Hamilton's liquor potassæ.

*Serial Sections.*—It is often a matter of considerable difficulty to arrange serial sections imbedded in celloidine, on account of their transparency. Apáthy<sup>401</sup> suggests as an aid in accomplishing this that a few drops of an alcoholic solution of safranin be mixed with oil of bergamot and the sections placed in it. Here they roll out and are cleared up, and the tissue takes on a rose-red. This color, however, disappears in a few hours on exposure to the light or sun, and the sections are in nowise injured.



The chemistry of safranin staining has been investigated by Diomidow,<sup>75</sup> who subjected stained material to various reagents. He found that the orange-yellow tincture of safranin was unaffected by alcohol, ether, concentrated acids, alkalies, or pancreatic extract. He, therefore, concluded that the chromoleptic substance belongs neither to the fatty nor to the albuminoid substances. When tissues were submitted for several hours to the action of boiling alcohol, however, before staining, no trace of the chromoleptic substance could be recognized, and the tissues had lost the power of polarizing light. The chromoleptic substance, therefore, appears to belong to the cerebrosides, which, according to Thudicum, are insoluble in ether and cold alcohol, but soluble in boiling alcohol. The conclusion, therefore, is, that the action of the alcohol in the preparation of the tissue (hardening), gives rise to an artificial substance which takes on the peculiar coloring with safranin.

*Henna*.—According to Regnault,<sup>7</sup> henna (*lawsonia inermis*) stains histological specimens yellowish brown. In aqueous solutions the dye has no selective action, staining the sections uniformly, strongly differentiating, however, the connective tissue. In alcoholic solutions the addition of an alkali (sodium or ammonium) enhances the staining power. Acids in small quantities have no effect, but in large amounts produce a bottle-green color. For a double stain with henna, hæmatoxylin or picrocarmine give good results.

*Saffron*.—Leven<sup>90</sup> finds that with this stain the karyokinetic figures (in muscle) show up dark red, the nuclei remaining pale, while the nucleoli are also stained. His formula is:—

R Saffron,	.	.	.	.	.	.	.	.	.	1 part.
Alcohol absolute,	.	.	.	.	.	.	.	.	.	100 parts.
Distilled water,	.	.	.	.	.	.	.	.	.	200 parts.

The specimen is first washed in water, then placed for a time in acid alcohol (0.05 per cent. HCl), then further dehydrated, cleared, and mounted in damar.

*Alcoholic Alum Carmine*.—Borden:<sup>440</sup>

R Cochineal, whole insect,	.	.	.	.	.	3 1 ( 4 grammes).
Alcohol, 95 per cent.,	.	.	.	.	.	3 4 (124 grammes)
Alum, saturated solution,	.	.	.	.	.	3 4 (124 grammes).

Pulverize cochineal, add the alum solution, and boil fifteen minutes,

occasionally adding distilled water to make up for that lost by evaporation. Cool, and pour without filtering into a ten-ounce or larger bottle. Add the alcohol and let stand, with occasional shaking, for forty-eight hours. Filter and preserve in close-stoppered bottle. This imparts a clear and brilliant color to the tissues, and is a useful stain for objects to be photomicrographed.

*Double-Staining Nucleated Blood-Corpuscles.*—For this purpose Gray<sup>107</sup><sub>Sept. 18</sub> spreads a thin layer of blood on a clean slide, dries, and then immerses in Grenacher's alum carmine for five minutes. The slide is then washed and placed in a weak solution of sulph-indigotate of soda or potash. When the slide has acquired a purplish hue, it is washed in water, dried, and mounted, slightly warmed, in balsam.

Boccardi's method<sup>126</sup><sub>July 15</sub> is to first employ as a hardening agent Flemming's solution, one-half per cent., or Carnoy's sublimate (sublimate, five; acetic acid, five; water, one hundred); or Bottcher's sublimate (saturated solution in absolute alcohol).

Fresh blood is mixed and left several days in one of these fixatives. A thin layer of Mayer's albumen glycerine is then spread on a slide, and a little of the mixture placed on it, after which the fixative is coagulated by heat. After washing in distilled water or alcohol, the blood is stained in an aqueous solution of safranin, gentian violet, or Ehrlich's or Delafield's hæmatoxylin.

*Fibrin.*—Weigert's method, as given last year in the ANNUAL, has been somewhat modified,<sup>54</sup><sub>p. 603</sub> and now is as follows: Sections are dried on a slide with bibulous paper, then stained for a few minutes in gentian-violet water, again dried with the paper, and placed for thirty to sixty seconds in Lugol's solution of iodine. From this they are placed in a mixture of xylol and anilin-oil (one to two) for decolorization, and finally mounted in balsam. The fibrin takes on a deep blue, the other parts being decolorized.

*Nerve-Tissue.*—Upson<sup>75</sup><sub>Nov.</sub> obtains excellent results by mixing five cubic centimetres of a Grenacher's alum carmine with ten to twenty drops of acetic acid, and one to three drops of phosphomolybdic acid, and filtering. Sections are stained in from five to ten minutes or longer, and are then washed, dehydrated, cleared, and mounted. For ganglion-cells, axis-cylinder, connective tissue, and especially overhardened material, five cubic centimetres of the alum-carmine solution saturated with sulphate of zinc and

filtered is used. Sections are left in this from one-half to twelve hours, washed in water, and then treated in the usual manner. Another method is to dissolve 0.06 cubic centimetres of carminic acid in four cubic centimetres of water with one cubic centimetre of alcohol. After three to ten minutes' immersion in this, the sections are removed, washed quickly in water, and then treated with either of the following, in which they should remain for several minutes, and are then washed, dehydrated, cleared, and mounted: Dilute acetic acid, gives yellowish-red color; saturated solution of plumbic acetate, gives a blue; sulphate of iron, black; sulphate of manganese, red; sulphate of nickel or chloride barium, violet. The myelin sheaths remain unstained.

*Central Nervous System.*—Pal<sup>2</sup><sub>M.H.</sub> claims for his modification of the well-known Weigert method that the process is rapid, the outlines of the elements are sharply defined, and nucleus and nucleolus can be separately stained. The method: Material hardened in Möller's fluid is imbedded in paraffin and sectioned. A three-fourths per cent. hæmatoxylin solution is prepared by dissolving the dye by means of heat and after it is cool adding a little alcohol. This solution must be comparatively fresh, and should not stand in the sunlight. Immediately before using, a few drops, three or four to ten of the stain, of a solution of carbonate of lithium are added, which turns the fluid to a violet-red color. The sections remain in this for five or six hours, when they should appear of a bluish-black color. They are then washed in water, to which, if the sections appear understained, a few drops of the lithium carbonate may be added. To differentiate the elements, the sections are placed for fifteen to twenty seconds in a one-fourth per cent. permanganate of potash solution, and then in Pal's solution (one part each of oxalic acid and potassic sulphide, two hundred parts distilled water), until the white and gray matters are plainly defined, which occurs in from one to two minutes. If black specks appear, or differentiation is not satisfactory, repeat the process. From the Pal's solution the sections are washed in water, when the nuclei may be stained in eosin or carmine, alum carmine giving the best results. Complete the process in the usual manner. The medullated nerve-fibres are colored blue, with red nuclei on a white background. To bring out the nerve-cells, stain in picrocarmine before using the alum carmine.

Pal<sup>2</sup><sub>22,24</sub> has also modified Exner's method. The fresh material is divided into small cubes and hardened for two days in an aqueous osmic acid solution, which requires changing at least twice. The hardened material is then washed, dipped into absolute alcohol, imbedded in wax or celloidin, and cut in glycerine. The sections are successively washed, dipped for ten to fifteen seconds into a one-fourth per cent. permanganate of potash solution, decolorized in Pal's solution, washed, stained in safranin or picrocarmine, dehydrated in absolute alcohol, cleaned in creasote, and mounted in balsam.

*Amyloid Degeneration.*—Letulle<sup>7</sup> has accidentally discovered that eosin and caustic potash have a remarkable selective power for amyloid infiltration of the tissues. Material stained in an alcoholic solution of eosin and then passed through a 30 to 40 per cent. solution of the potash presents the following tincture: (1) Elastic tissue becomes violet red; (2) connective tissue remains either uncolored or acquires a yellowish-pink stain; (3) muscular fibres become an orange brown of varying intensity, according to the degree of decolorization; (4) the walls of the capillaries and the perivascular and pericapillary connective tissue shows a brilliant rose-color. Masses of amyloid substance of considerable thickness present a light-yellow coloration.

*Photomicrography.*—In regard to this interesting subject, Parker<sup>23</sup><sub>Aug.</sub> observes that by it we can demonstrate more clearly and teach more accurately the minute changes constantly taking place in disease than by any other means. It is a question, however, if photomicrography is not to too great a degree taking the place of drawing, a method of reproducing the microscopical picture the advantage of which to the student is very great. I am, therefore, glad to notice that Pierson<sup>260</sup><sub>No. 4</sub> has entered a protest against this unwise neglect of the pencil for the easier and more fascinating photocamera. One excellent use, however, to which the camera can be put, is, as suggested by Bastelberger,<sup>75</sup><sub>p. 449</sub> in fixing permanently the pictures of rapidly perishable preparations, and in making accurate measurements by photographing the micrometer scale along with the object. In the preparation of objects, Rafter urges that all permanent mounts be made with reference to future photographing.<sup>260</sup><sub>p. 77</sub>

## BACTERIOLOGY.

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IN opening a new department like that of bacteriology a few words of explanation, and perhaps apology, may be necessary; not an apology for the existence of the department, but for its incompleteness. The amount of work that has been done in times past to perfect methods and to apply these perfected methods to the increase of our knowledge is simply enormous, and no complete review could possibly be compressed into the space available for it. I feel, however, that the position from which my point of view is taken should be broadly stated, so that those who differ from me may at least know why. Experience shows, without the possibility of a doubt, that an enormous amount of confusion constantly arises from the fact that observers fail to realize the supreme importance of a common standard of comparison, and that, in the study of bacteria, this common standard can only be obtained by adopting similar methods of cultivation. The necessity for such a procedure is apparent upon the least reflection, and the difficulty is in choosing. It is entirely unnecessary to impress the importance of using all solid and fluid culture media upon those who have undertaken to do much in the way of isolating and classifying new forms of bacteria, but the case is apparently different with many others. Not infrequently the assertion is made that a new organism has been separated from a pathological process, and the claims of the discoverer are acknowledged for a time, until control work shows that the new organism is nothing but one which has been seen in other processes many times before—the complete study of its life-history not having been made at one time and by one observer. Therefore, in making claims of new discoveries in this field, the desire to find something new should be most rigidly controlled by the desire to prevent confusion, and no organism should be declared to be new until the observer is able to put forth a complete statement of its behavior under all conditions of cultiva-

tion in artificial media, and, by this means, is able to state some constant peculiarity which separates it from others. In other words, the occurrence of bacteria, with similar morphological characteristics, in differing pathological processes, is no longer sufficient to separate them from each other, for our constant experience is that the same organism occurs in and gives rise to widely varying clinical processes.

Scientific progress seems to be carrying us irresistibly toward the etiological and away from the clinical classification of disease, and one cannot help hoping most earnestly that this tendency will be less hindered in the future than in the past by hasty and incomplete solutions to problems requiring the most intense thought and exact care. From these few reasons it will be easily evident, therefore, that I stand with those ready to reject, as unworthy of attention, work which has not been carried out with all the exactness and care required by investigations of this kind, and in the true scientific spirit of a desire for the truth, apart from thoughts of personal achievement.

#### METHODS.

Taking it for granted, then, that the reasons for the rapid advancement of our knowledge of the lower forms of life and of their connection with disease are well known, it will be enough simply to state that they consist essentially of the introduction into common use of (1) aniline dyes, (2) homogeneous immersion lenses and sub-stage illumination, and (3) solid culture media. Since these three agents have been used in all their infinite variety, more rapid increase of the scientific knowledge of disease has occurred than ever before in twice the same length of time. The lenses of the new apochromatic glass have furnished new and more perfect appliances for microscopic work, but my experience with them seems to show that their greatest utility lies in the direction of photo-micrography, rather than direct observation, and their advantage here is because the illuminating and actinic focuses are nearly, if not quite, the same. The oculars of the new glass are of great assistance, however, enabling the observer to obtain high amplification with a moderately low power objective and a consequent increase of working range. Some of these new objectives—as made by Zeiss—are disgracefully bad, especially in the matter

of spherical aberration. One was submitted to me a short time ago (apochromatic two millimetres) which permitted not more than a quarter of the field to be in focus at once. Of course, this was not the fault of the glass, but of the maker who finished and the seller who tried to dispose of such a piece of workmanship.

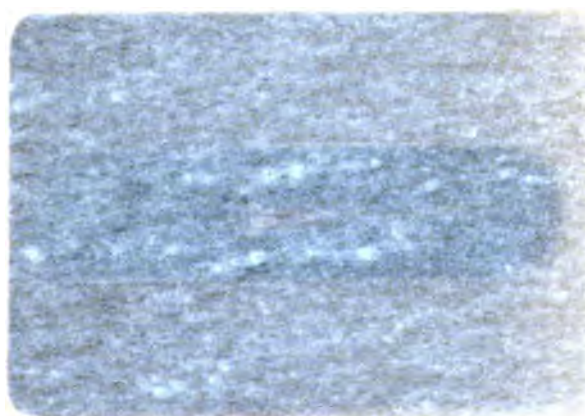
Photography as applied to bacteriology may be of great value in permitting permanent and accurate records of appearances to be made and preserved, either for future reference or for comparison with the work of others at a distance. One part of it that has been somewhat neglected, or to which attention has been unsuccessfully directed, is that of reproducing the appearances of test-tube cultures by this method. The difficulties presenting themselves to a practical photographer in an attempt of this nature lie in the presence of the innumerable cross-lights coming from the sides of the round glass tube and from the highly refracting nutrient medium—either nutrient gelatine or agar-agar—within. These cross-lights will obscure the appearances of the culture in their centre unless some special method of destroying them be adopted. This has been attempted in various ways—by illumination from above, from above and behind, and so on—but with no very perfect results as regards sharp definition of the colony, which is, of course, the element most to be desired. After a number of experiments, I have been employing a method which seems to serve the purpose very well—at least, the cross-lights are completely done away with—and it has been found possible to obtain impressions of the feathery growth in nutrient gelatine of the bacillus of mouse-septicæmia and of anthrax—two as crucial tests as could well be used. The *principle* involved is to destroy the high lights by immersing the tube in a medium of the same index of refraction as the medium it contains, and to remove the lights from the convexities of the glass by having the external vessel square-sided. The *method* is simply to fill the tube above the culture with nutrient gelatine, and then to place the tube in a flat-sided cell containing the same material. A photograph may be readily taken by transmitted light and the developed plate may be used for a transparency slide or for printing. A true negative, however, must be obtained by taking a second plate from the first, which is a *positive*. How successful this method can be made is shown by the two specimens in the chromo-lithograph accompanying this article—one representing

a culture of the anthrax bacillus in nutrient gelatine before liquefaction has begun, and the second showing a culture of the staphylococcus pyogenes aureus in an advanced stage of liquefaction. The ease of the method is its great recommendation, and its value lies in the power here presented of obtaining exact reproductions of peculiarities of growth in needle cultures, which may be of great importance. Of course, pigment production is not indicated, but that is a secondary consideration as compared with form, and is much easier of reproduction by the artist or by description.

A method for the easy reproduction of plate-cultures has been suggested by Giaxa,<sup>50</sup><sub>Bd. 3, p. 700</sub> which consists in simply placing the plate-culture over a piece of sensitive paper, as one would a negative, and exposing it to the light—printing from the plate-culture, in other words. Steaglein,<sup>50</sup><sub>Bd. 3, p. 670</sub> has quite an interesting article upon rapid photo-micrography, using for his illuminating agent a mixture of sixty parts by weight of chlorate of potash, thirty parts of magnesium powder, and ten parts of sulphuret of antimony. The length of the illumination from this mixture is said to be from one-thirtieth to one-fiftieth of a second and its effectiveness is much greater than even the electric light. Zeiss<sup>1191</sup> announces the new apparatus for photo-micrography, which can be used with sunlight, electric or magnesium light, and really seems to be the most complete that has yet been devised, its special advantages being the ease with which the main camera is adjusted or moved out of the way for the arrangement of the objects to be photographed, and the combination by which a vertical camera may be secured with the least expenditure of time and annoyance.

*Culture Media.*—The most important advance, or rather new thing, in the way of nutrient media which has been suggested in the past year is the "milk-rice" of Soyka, of Prague.<sup>88</sup><sub>Oct. 10</sub> The method of preparing this is as follows: To one hundred parts *by weight* of rice-powder (not the rice-meal of commerce, but fresh rice finely powdered for the purpose) are added two hundred and ten parts *by measure* of a mixture of milk and bouillon, the proportion of milk to bouillon being as three to one. This gives a combination of five to six parts by measure of bouillon, ten parts by weight of rice, and fifteen parts by measure of milk. The mixture is carefully beaten together in a mortar, and then placed in glass dishes with a pipette and sterilized. To avoid the change









Chromo-lithographic reproduction of photographs of cultures of the anthrax bacillus,  
and of the *Staphylococcus pyogenes aureus*. (Photog. by Dr. Ernst.)



produced in milk by prolonged heat, the sterilization is carried on—in steam-heat—for fifteen or twenty minutes for four successive days, when a beautiful, clear, homogeneous, white material is obtained, capable of nourishing almost any form of bacterium. The advantages claimed are: (1) its exactness, not varying as do ordinary nutrient gelatine or bouillon; (2) its comparative ease of preparation; (3) its adaptability to any organism; (4) the flat upper surface, being non-porous, as is potato; (5) the consequent sharper, more definite, growth of colonies upon its surface; (6) the possibility of growing colonies of various bacteria upon it side by side; (7) the variations that can be made in its employment. Certainly, those who have seen this new material speak very highly of it.

Another new medium is the *albuminate of soda*, first used by Tarchanoff<sup>14</sup><sub>Apr. 25</sub> and Kolesnikoff,<sup>571</sup><sub>Nov. 24</sub> the method of preparation of which consists in washing fresh eggs first with an alcoholic solution of potash soap, then with water, then with corrosive sublimate solution (one to one thousand), and, finally, again with water. This done, the eggs are placed in a 10 per cent. solution of caustic soda (two hundred to four hundred grammes for each egg) and allowed to remain for three or four days at the temperature of the room. During this time enough of the soda penetrates, by diffusion, into the interior of the egg to transform the entire white into an alkaline albuminate. This albuminate is feebly alkaline, is less fluid than the white of a normal egg, is easily soluble in water, and becomes a transparent, solid coagulum at 75° to 80° C. It becomes solid in thirty-six to forty-eight hours at 37° to 40° C. If the eggs are left too long in the alkaline solution the albumen becomes hard and useless. After they are taken out of the soda, they are carefully washed with water, corrosive sublimate, and water again, are opened, and the white poured into sterilized flasks. In these flasks each white is mixed with 10 to 50 per cent. of water in the water bath. The solution is then poured into test-tubes, sterilized three days at 65° to 70° C., and finally solidified at 80° to 85° C., which after three or four hours gives a firm, amber-colored, and absolutely transparent medium, which is very good, indeed, for the growth of many organisms.

The most extraordinary assertion, however, comes from Noeggerath,<sup>54</sup><sub>Jan.</sub> who suggests what might be called the *color method*

of cultivating bacteria for purposes of easy and rapid diagnosis, differing from the "color reaction" as studied in the case of the cholera spirillum, because this is applied to the cultures with ordinary chemical reagents, the mineral acids more especially, whilst Noeggerath's method is to use a mixture of aniline colors with which the nutrient material is colored before the colonies grow in them. The colors used are methylene blue, gentian violet, methyl green, chrysoidin, and fuchsin, mixed in watery solution, in the proportion of two, four, one, four, and five cubic centimetres respectively, and diluted with two hundred centimetres of distilled water. When properly mixed, the resultant color should be dark gray or bluish black, and seven to ten drops are to be mixed with ten cubic centimetres of nutrient gelatine. Then, upon cultivation on this mass, the idea is that each organism will produce a special color of its own in the resulting growth or in the nutrient medium. The author illustrates his paper with a plate. I have found it extremely difficult to secure a proper mixture of the colors as given in the paper, and am not aware that any confirmatory evidence has been offered of the value of this method of separating individual bacteria. That some more rapid method of diagnosis must be devised than the present slow one of plate-cultures and various nutrient media is very evident, however, before great ease in bacteriological work can be attained.

From our corresponding editor in Havana, Dr. E. F. Plà, comes the following suggestion for the rapid preparation of agar-agar: The meat infusion should be placed in a porcelain-lined vessel and raised to boiling point, and then  $1\frac{1}{2}$  to 2 per cent. of the fibrous agar-agar introduced. After this has been melted (which occurs in the course of half an hour, and should be accompanied by frequent stirring to prevent the agar-agar from adhering to the sides of the vessel), the nutrient material should be placed in a Chamberland's auto-clave at one and a half atmospheric pressure, when, upon cooling, the insoluble portions of the agar-agar will be found to have settled to the bottom of the mass, leaving the upper portion entirely clear. This lower portion can then be cut off and rejected, and the remainder melted, put into tubes, and sterilized in the usual way. By this procedure the annoying delays and failures attendant upon filtering the agar-agar in the ordinary way are entirely avoided.

Schimmelbusch<sup>54</sup><sub>Aug. 15</sub> has suggested a modification of Koch's plate-cultures which may be very useful. It consists in using two glass plates separated by a pasteboard frame running around the edges, the whole held together by metal springs. There is thus formed a chamber sufficiently wide to allow the ordinary flowing of the plate with the nutrient material and of the replacing of the second glass plate and clamping it down for a cover. The economy of space, ease of handling, and readiness of microscopic examination without risk of contamination will make themselves readily apparent.

Various methods have been suggested for the observation of the growth of anærobic bacteria. H. Buchner<sup>54</sup><sub>Sept. 10</sub> speaks of one depending upon the power of absorption of oxygen by pyrogallol, the action being obtained by putting in the bottom of a large tube one grain of pyrogallic acid, and then adding with a pipette ten cubic centimetres of a 10 per cent. solution of caustic potash. The test-tube containing the culture is then introduced into the large tube, the cotton plug of the smaller being loosened to allow freer absorption of the oxygen.

Lüderitz<sup>58</sup><sub>Oct. 11</sub> speaks of several methods, those already known, and especially that of C. Fränkel,<sup>50</sup><sub>Dec. 1</sub> which is simply the preparation of an "Esmarch plate-culture" in the ordinary way, and then the filling of the centre of the tube with fluid nutrient gelatine. Jeffries, of Boston (account of method not yet published), has made use of still another method—filling the tube-cultures above the nutrient material with pure mercury, and inserting them in small porcelain saucers, the latter to avoid any effects due to pressure. This he tried with a very large number of different bacteria and found to work perfectly, being simple, easy, and absolute in the exclusion of oxygen.

The past year has seen the usual number of "safe, certain, and rapid" methods of staining the bacillus of tuberculosis, and I desire to enter a vigorous protest against their too ready adoption. There is not much risk of this among the skilled bacteriologists, but to the busy practitioner any way of shortening the twenty-four hour Koch-Ehrlich method seems to appeal with peculiar force. This is, of course, perfectly natural, but would not be so much the case if the usual loss of accuracy occasioned by the employment of these methods was known. For clinical purposes a diagnosis is

desired, and, of course, the first object is *certainly* that the organisms seen to have resisted the decolorizing agents are really the bacilli of tuberculosis. If this is uncertain the value of any observation is lost. Most of the new and short methods are faulty, inasmuch as they fail to furnish this certainty, and none of them have been proved by long, careful, and comparative tests to be as accurate as the old way. Therefore, before our patient is condemned to tuberculosis—if the matter be one of diagnosis—we should be sure that the method employed for demonstrating the bacilli of that disease is accurate. The more especially interesting articles upon staining are one by Babès on the staining of parts of bacilli,<sup>58</sup> and that of Baumgarten, as modified by Günther,<sup>60</sup> by which a triple stain of the elements in the field is obtained. This is as follows:

1. Wash sections in absolute alcohol.
2. Five minutes in boro-picrocarmine, taking off excess of color with filter paper. (The boro-picrocarmine is obtained by throwing powdered crystals of picric acid into a solution of Genler's borated carmine until a blood-red color appears.)
3. Wash two minutes, *twice*, in absolute alcohol (of a Rhine-wine color by adding one or two crystals of picric acid).
4. Place in Ehrlich's gentian-violet solution (aniline water, one hundred parts; alcohol, ten parts; alc. sol. gentian violet, eleven parts) for one minute, and take off excess of color with filter paper.
5. One minute in Lugol's solution of iodine and iodide of potash (iodine, one part; iodide of potash, two parts; water, three hundred parts).
6. Thirty seconds in absolute alcohol.
7. Remove excess of gentian violet by placing for ten seconds in acidulated alcohol (muriatic acid, three parts; absolute alcohol, ninety-seven parts); watch this decolorization very carefully.
8. Five minutes in absolute alcohol, to which has been added a few crystals of picric acid, enough to give a pale-yellow color.
9. Clear up in oil of cedar.
10. Mount in Canada balsam dissolved in xylol.

The results to be obtained from this method are very beautiful. For those who are interested in a brief and comprehensive statement of the more recent developments of the principle of staining with aniline colors, the historical and critical review by P. G. Unna<sup>319</sup> will be exceedingly instructive.

McFadyean,<sup>2</sup> describes a test-tube for fluid cultures which may prove useful on certain occasions. It consists, in the words of the author, of an ordinary test-tube with a small lateral arm



about two inches in length. This arm joins the main tube about two inches from its lower end, and forms, with the proximal part of the tube, an angle of about forty-five degrees. The tube is filled for about an inch and a half of its depth with the liquid medium and sterilized in the usual manner. When the tube is to be inoculated it is slowly inverted so as to allow its contents to flow into the lateral arm. The precautions to be observed in using the tube are: (1) to use of the fluid medium a volume slightly smaller than the capacity of the lateral arm and (2) to invert the tube slowly, turning it in a vertical plane toward the lateral arm. An advantage of this tube is, of course, the great one of being enabled to invert the fluid cultures whilst inoculating, thus very largely diminishing the chances of contamination from the atmosphere.

*Special Processes and Bacteria.*—Picrocarmine is said to be the most effective agent for staining the actinomycosis fungus.<sup>69</sup>  
A small portion of the fluid from the tumor or of the pus is prepared upon a cover-glass in the usual way and laid upon the carmine solution. The staining is completed in about three minutes, and the preparation may then be examined in water or glycerine. Sections from fresh as well as hardened tissues may be stained in the same way, and the fungus will show various shades of yellow, while the other tissues will present the red color.

Pasteur<sup>14</sup> speaks of the varying reducing effects of the growth of bacteria upon different coloring materials, showing that various colors are altered—*hydrogenated*, as he calls it—in various lengths of time; thus, Bordeaux red is decolorized very rapidly; Nicholson blue and imperial violet in several days; fuchsin and cochineal—the coloring matter of wine—only after several weeks. He suggests, therefore, that, thanks to these varying effects, we may have a useful reaction for discovering the artificial coloring matters used in the adulteration of wine.

Smith<sup>9</sup> speaks of the bacillus ræuleas, a new chromogenic organism obtained in cultures from the water of the Schuylkill River near Philadelphia, which, as it possesses no pathogenic power so far as observed, is of special interest only as adding to our knowledge of microscopic botany. It may be confused with the bacillus syncyanus, bacillus violaceus, or micrococcus cyaneus, but the color is so intensely blue, and in old colonies so dark, that it alone should differentiate in every instance.

Charrin and Roger<sup>1</sup> have been carrying on some interesting investigations in regard to the alteration of the functions of chromogenic bacteria, and find that there are many circumstances resulting in the growth of the organism and at the same time in the non-development of the usual pigment; these circumstances are usually concerned with the amount of nutrient material present, and especially with the more or less free access of oxygen to the culture. Other questions, such as modification of pathogenic properties at the same time as change in pigment-producing power, suggest themselves, and are still under investigation.

Cornil and Toupet,<sup>479</sup> attracted by an outbreak of a fatal epidemic among the ducks in the Jardin d'Acclimatation in Paris resembling, in the symptoms and anatomical lesions produced, those found in chicken-cholera, investigated the birds dead of the disease with a curious result. As just stated, the anatomical changes observed were the same as those to be found in chicken-cholera, and in addition an organism was found in these lesions apparently identical, both morphologically and under cultivation, with the bacillus of this disease. Its pathogenic properties were different, however, inasmuch as it had *no effect* upon chickens or pigeons, and was fatal to rabbits only in excessive doses. The authors offer no explanation of this curious fact, but content themselves with saying that "if, by reason of the analogies between these bacteria and the symptoms they produce, it is desired to unite the two diseases into a single group, it must be supposed that the virus is fixed in ducks in a constant degree, and inferior in strength to that in chickens."

Work upon the bacillus of Asiatic cholera has not by any means been completed, any more than can be said of other organisms. That it is still progressing may be seen by the several papers that have been published summarizing work done to elucidate various parts of its life-history. Among these mention can be made of but one or two. A ready means of diagnosis has been sought for some time, and the so-called *cholera-red* reaction is thought to serve that purpose. Its history is, briefly, that in 1886 Pochl first noticed that cholera bacilli produced a reaction with the mineral acids which he called "cholera-red," and in 1887 Bujwid published a similar observation. Since then he has given a great deal of attention to the subject, and finally describes<sup>113</sup> a

reaction which he believes to be characteristic. To a 2 per cent. sterilized solution of peptone  $\frac{1}{2}$  per cent. of common salt and bicarbonate of sodium is added to produce an alkaline reaction. This solution is inoculated with the cholera bacillus, and kept at 37° C. for twenty-four hours. If hydrochloric, phosphoric, sulphuric, or oxalic acid be then added to the culture a beautiful violet-red results, best seen in hydrochloric acid. Several other organisms (Finkler's, Brieger's, Miller's) give the same results, but only after a longer time and in a less pronounced degree. Sal-kowski<sup>20</sup><sub>Bd. 110, p. 395</sub> believes that the reaction is produced by the indol formed by the bacilli, as does Brieger,<sup>20</sup><sub>Dec. 14, '97</sub> who also thinks the same thing in regard to the "cholera-blue."

Zäslin,<sup>41</sup><sub>Aug. 9</sub> in an elaborate article, gives the result of his studies of the bacillus of Asiatic cholera, which seem to indicate a certain mutability of form in that organism, which is interesting and certainly of importance if true. The conclusions are summarized as follows: (1) Koch's comma bacillus has altered, in Europe, into several varieties; the one generally observed under cultivation as yet answers to the description given of it by Flügge; (2) varieties exist which grow vigorously at much lower temperatures than the freshly imported organism, and die at a much lower maximum temperature, whilst they find the body temperature very favorable for their development; (3) bacilli obtained in simultaneous epidemics at Genoa, Naples, Palermo, in the spring of 1887, behave differently in various ways (in plate and gelatine cultures, least in developing temperature); (4) a bacillus which answered the requirements of Koch for a month, later showed marked variations in the same nutrient media; (5) the variations shown by Koch's bacillus appear with uncertainty and not in a regular way, but they occur in the usual methods of observation; (6) my observations, so far, do not show that the cholera bacilli follow any other laws than those laid down by Darwin for animals and plants in general in respect to their production of varieties; (7) formation of fixed varieties can also occur under unusual conditions of observation. This occurred in the researches of Canestrini and Morpurgo, probably through the struggle for existence (transference from test-tube to test-tube of the same nutrient material with varying proportions of the active organisms), and in other cases (Tizzoni and Cattoni, Flügge's variety) by the combination of the

same nutrient material (plate-cultures) and the transference of masses (transportation from test-tube to test-tube). These observations are exceedingly important, and it is certainly to be hoped that they will be controlled by careful study wherever the opportunity for comparative observations may arise.

In view of the enormous amount of work that has been done in the direction of increasing our knowledge of the life-history and place in medicine of bacteria, the question is often asked, "What has it done for clinical work?" and this query is not infrequently accompanied by something resembling a sneer. However little such an expression may affect the workers for scientific advancement, whose reward comes from the feeling that they are adding to the sum total of human knowledge, with no thought of failure to obtain immediate and tangible results, still it may be encouraging to some to know that the results of so much work are not relegated to the future entirely, although it is true that the complaints come almost wholly from those who are least acquainted with scientific work. A paper by Weichselbaum,<sup>57</sup> on "The Diagnostic Value of Bacteriological Research," gives numerous instances illustrating the value of what may be done by such methods. The methods of sterilization of food for digestive disturbances used by me since 1884 in my practice, and since adopted by Soxhlet and many others for infant feeding, has shown its great value by the results obtained, and instances could be cited extending far beyond the limit of this paper to prove the value of the work as applied clinically, if such proof were necessary to-day.

Eberth and Schimmelbusch<sup>54</sup> had an opportunity for making careful researches on the bodies of a number of ferrets (*Mustela furo*) dead of an epidemic that had broken out among them. This opportunity they took advantage of with the result of finding an organism which they studied very thoroughly. They say that it "has a special interest, because it resembles very strongly, in both morphological and culture characteristics, the frequently described cause of chicken-cholera, rabbit-septicæmia, swine-plague, and deer-plague." An observer might easily mistake one for the other, but, while the analogies are very great, the behavior toward chickens is very different, these birds being unaffected by this organism of "ferret-plague." So, too, it resembles closely the bacterium of swine-plague described by Selanders<sup>50</sup> as occurring

in Sweden and Denmark, but it differs from this also by its behavior toward different animals, pigeons being refractory to Selander's bacillus but very susceptible to that of our authors; rabbits, too, are killed by Selander's bacillus, whilst the ferret-bacillus produces merely a local process after corneal or subcutaneous inoculation.

*Green Pus.*—Kunz<sup>2</sup><sub>Mar. 21</sub> has carried out some interesting experiments upon the coloring matters of green pus, the results of which show that side by side with pyocyanin and pyoxanthoze (the coloring matters of blue pus) a third (still undescribed) pigment was present, which was characterized by a beautiful green fluorescence under direct rays of light. It was soluble only in water and diluted alcohol, and the discoverer has named the new body "pyofluorescin."

*Gas-Producing Bacillus.*—Arloing<sup>211</sup><sub>Dec. 25, '97</sub> describes a new gas-producing organism which he obtained from an eye enucleated for traumatism, and which showed some elements resembling the "*vibrion serpentiforme*" of Pasteur, but also appeared as very fine bacilli from 0.0025 to 0.0060 millimetres in length and without spores. The description given is very complete, and it is said to be capable of producing a gas-formation in man under exceptionally benign conditions, which is not the case with the "*vibrion septique*." He differentiates the two as follows: "In brief, this new gas-producing bacillus differs from that of gangrenous septicæmia (1) by its morphology; (2) by its evolution; (3) by the living soils which are favorable to it; (4) by its culture; (5) by its relative benignity toward man.

*Germ Theory a Century Ago.*—A pamphlet of eighty-seven pages by an unknown author was published in London in 1788, and entitled "A Treatise on Fevers, Wherein their Causes are Exhibited in a New Point of View, to Prevent Contagion; and Putrid Sore Throat, Inflammatory Fluxes, Influenza, Consumptions, as well as the Low Nervous Fevers that Terribly Affect the Spirits, may be Cured with Ease." It is a very interesting book in the light of the discoveries of more recent times, and a few quotations from an editorial on its contents<sup>2</sup><sub>Feb. 11</sub> will certainly bear repetition here. After speaking of how his experience was obtained, the author passes on to the speculative and explanatory part, consisting of an exceedingly ingenious argument, an example of that most

useful and profound of logical methods, analogy, based upon admitted facts, followed by a clear and coherent chain of reasoning, and is perhaps as convincing and even more free from fallacies than if he had attempted to prove his case by microscopical demonstration. He states, in the first place, that the cause of these multiform disorders is generally allowed to be some invisible noxious matter in the air; of its intimate nature there were various opinions, but perhaps very little curiosity felt: "Some consider it to be a sulphurous exhalation from the earth, but this cannot be, for, if so, acrid and sulphurous fumes would increase it instead of checking or annihilating it. Another theory is that it is due to the products of putrefaction; but how can dead and putrid matter ever get such activity as to work such astonishing results?" It must, therefore, be something endowed with a more powerful activity than anything belonging to the mineral kingdom or simply putrefying, and must, therefore, be something actually living. In this he shows considerable penetration, and, there being no "cell theory" in his day, he does not stop to consider whether the poison may be embodied in vitiated cells or particles detached from the body, though retaining their specific activity, but concludes that it must be organisms having an independent existence. For this view, surprising and novel enough at first, loses some of its singularity if we search for resemblances elsewhere. For, just as it was well known that itch is due to the presence of *acari*, insects visible by the aid of the microscope, so "close attention to these matters in numberless cases during many years has proved beyond a doubt that the gaol distemper, putrid fever, plague, and infectious epidemics generally, proceed not from matter putrid in itself, but from invisible insects also, that, floating in the air at times, are lodged in the skin in immense quantities. Feeding here in clusters, they produce pimples, pustules, etc.—for instance, the eruption of small-pox." He overlooks, or at any rate makes no mention of, the possibility of their entering the body by the air-passages and working their way from the lungs and alimentary canal. In summing up his theory, he says that, generally speaking, there are only two sources of the animalcules—subterranean, which operates in all sorts of weather, and is chiefly accompanied by electric phenomena; the other is the surface of the earth, swamps, filthy lakes, stagnant ponds, etc. The eggs left on the soil develop in

the summer, and "the multitudes effluvia into the air." Though recommending draining the land and fumigating or watering the air, it is rather strange that the author overlooks the value of heat in disinfecting clothes, etc.

*Groupings of Bacteria.*—Héricourt,<sup>92</sup><sub>Dec. 10, 97</sub> in a long article, "*Les associations microbiennes*," discusses the occurrence of more than one variety of bacterium in the lesions of certain processes in man and the lower animals, and the effect that such association may have in modifying the clinical manifestations of specific diseases. As the author declares, there is no need of insisting upon the importance, from the point of view of general pathology, of such associations. It is the notion of complex morbid processes evolved by dependence upon multiple agents that it seems necessary to substitute in many cases for the idea of morbid processes considered as entities; and this, not only in the case of diseases with complications, but in those occurring in a regular and constant fashion. These diseases, apparently simple, are in reality complex and require artificial means to separate their causal factors. As an example of such processes the author quotes the work done upon the pustules of variola and varicella, and Guttman's observation of the streptococcus pyogenes aureus, streptococcus pyogenes albus, and streptococcus cereus albus with others in the pustules of the first, and the streptococcus pyogenes aureus, a white non-liquefying staphylococcus, and his staphylococcus viridis fluorescens in the limpid serum of the latter. In an article upon the etiology of puerperal fever (not yet published) I have insisted upon the same point, taking the ground that puerperal fever is not by any means a process due to the activity of a single organism only, but may equally well be the result of the growth of several distinct varieties. These opinions are merely the crystallizing of the legitimate results of recent work. Héricourt's article is well worth perusal in the original, because of the fairness of his views and the clearness with which they are expressed.

*Late Results of Experimental Infection.*—Charrin,<sup>93</sup> reports some interesting observations in this direction, made especially with the bacillus pyocyaneus. He calls attention to the fact that most of the results observed in experimental pathology are those which quickly follow the inoculations, because, in the first place, animals experimented upon are not, as a rule, kept a long

time, and, secondly, because experimental infectious diseases usually terminate promptly by death. He says that he has determined by many experiments that the bacillus pyocyaneus can produce disturbances of the kidneys; that in a rabbit inoculated at three different times, this bacillus could be found in the urine and at the same time albuminuria appeared; that very shortly the organisms disappeared whilst the renal disturbances continued and finally produced death, at which time careful cultures failed entirely to show the presence of any bacteria. In other words, the infection itself had ceased whilst its consequences remained. He claims the same analogy in the case of human beings—there is infection and intoxication; an attack of scarlatina terminates, one of diphtheria ends, but a nephritis or paralysis is often established, and one seeks in vain at this time for the micro-organism which was originally present and started the perverted growths of the cell-tissues.

*Immunity.*—The question of the existence of immunity against the first attack of an infectious disease or of its establishment after the first attack has been successfully gone through with, has received new attention since our knowledge of the etiology of infectious processes has developed in the direction of bacteriology. Efforts have been made to discover methods of prophylaxis by inoculations of various kinds with “attenuated” virus, and much work has been done to study out the nature of the change that takes place in the animal tissues resulting in “immunity,” for there is no dispute that this condition does occur and lasts for a varying length of time. Sola<sup>145</sup><sub>Aug. 25</sub> publishes an elaborate discussion of the subject, in which he reaches the following conclusions: (1) Parasitic nosogenesis is determined by two essential factors, the cryptogamic seed and the proper histological soil for its development; (2) the proper soil for the development of pathogenic bacteria proceeds from the median layer of the blastoderm, with the exception of the leucocytes and lymphoid cells, which are germicidal; (3) intact epithelia represent an impossible barrier against the invasion and cultivation of bacteria, whilst, their continuity destroyed, the entrance of bacteria is to be feared; (4) histology shows many conditions which can rationally explain immunity, whence it is not unreasonable to hope that histochemistry will furnish some explanation of the nature of the chemical conditions which are



destructive to cryptogamic development ; (5) susceptibility to parasitic growth depends upon epithelial solution of continuity in wounds or scratches or upon deficient vigor, as in ordinary catarrhal conditions ; (6) the slighter parasitic affections which have been considered to be hereditary are thus reduced to the transmission of a vulnerable epithelial quality (*cualidad epitélica vulnerable*) ; thus, a tuberculous parent may transmit to the offspring certain deficiencies of the pulmonary epithelium which furnish a mode of entrance and favorable place for the growth of the specific bacillus. Roux and Chamberland<sup>202</sup><sub>Dec. 97, Feb.</sub> have investigated a branch of this subject experimentally, and have endeavored to find whether an immunity can be established by the introduction of chemical products, instead of the living bacteria. Using the cultures of the vibron septique (bacillus of malignant œdema) and raising them above 100° C. in order to destroy the living organisms, they find that a chemical substance remains which can serve as a vaccine against septicæmia. They report similar results for symptomatic anthrax (*charbon symptomatique*). Chantemesse and Widal think they have found the same thing in regard to the bacillus of typhoid fever—a very difficult thing to prove, by the way—and Gama-leia<sup>35</sup><sub>p. 49</sub> claims to have discovered a similar method of vaccination against Asiatic cholera, and is to attempt to prove his claims in Paris at the Pasteur Institute under the auspices of the Academy of Science. But the results of his work are not yet known. Gutt-mann<sup>69</sup><sub>Aug. 97</sub> gives a short review of the condition of the question at this date, and Emmerich and Mattei<sup>54</sup><sub>Oct. 1</sub> give a number of interesting experiments, with results summarized as follows: (1) rothlauf bacilli disappeared from the bodies of rabbits previously rendered insusceptible by preventive inoculation in from fifteen to twenty-five minutes ; (2) this occurs whether a small or enormous number of bacilli are injected (the latter, of course, being very rarely the case in real life) ; (3) the destruction occurs by means of a material formed by the tissue-cells from the elements broken up by the bacilli, from which the cells probably form soluble bacterial poison ; (4) this production occurs in the cells, from which the poison is separated, or outside of them, when the contractions of the plasma of the tissue-cells carries the soluble material into the intercellular lymph spaces ; (5) this anti-bacterial poison is not formed in protected rabbits previous to but at the time of the second invasion ;

(6) this poison formed by the tissue-cells is entirely innocuous to them; (7) no phagocytosis was observed as taking part in the destruction of the rothlauf bacilli. Much and exceedingly important research remains to be made in this direction; we have but just opened the mine of knowledge that should be worked, and which gives every promise of the richest repayment for labor spent. Something more will be said upon the subject in connection with *phagocytosis*.

*Bacteria in Milk.*—Löffler<sup>13</sup><sub>Jan. 10</sub> gives an exceedingly interesting review of this subject from a bacteriological point of view, and after reviewing the literature and detailing the bacteria of the ordinary changes in this fluid he speaks of his study of pathogenic organisms in the same material. He impregnated the milk with litmus, and upon inoculation with the staphylococcus aureus, albus, and citreus, the milk, which was previously blue, would become white, the creamy layer alone remaining red, in this way and to a certain extent demonstrating the formation by the bacteria of some reducing substance besides lactic acid. The typhoid bacilli impart a slightly reddish tinge to blue milk, while otherwise deprived of any modifying action on milk, proving the formation of lactic acid. Anthrax bacilli first precipitate and then peptonize the caseine of milk with a faintly alkaline reaction. The erysipelas coccus changes the blue color into red without producing coagulation of the milk. The bacilli of tuberculosis, glanders, and diphtheria have no material action upon milk, whilst Friedländer's pneumonia bacillus decolors blue milk. Fränkel's pneumo-bacillus makes it acid, and Koch's cholera spirilla decolor litmus milk from below, while over this white layer there is to be seen a grayish-blue or almost reddish one. Finkler's organism does the same thing, whilst Deneke's spirilla give a yellow tint to the cream layer. Miller's spirillum is distinguished by precipitating and peptonizing the caseine of milk and turning the fluid to a pink color. Löffler's results lead him to conclude that this method, if further developed, would lead to the discovery of many valuable diagnostic characteristics for various bacteria.

*Museum.*—An exceedingly valuable thing for any centre of bacteriological work would be a museum where could be found photographs, cultures, slides, and other preparations for comparison and aid to research. So far as we know, Soyka<sup>58</sup><sub>Mar. 1</sub> is the first to give

utterance to the need for doing such work, the advantages of which are obvious. In the article mentioned he and Král describe the methods and glassware necessary for obtaining permanent preparations of cultures of various organisms, and that these are successful is demonstrated by the author's exhibitions in Prague, Copenhagen, and elsewhere. The collection consisted of about sixty pure cultures, each in from three to five specimens, and divided into two groups, one in round glass boxes on potatoes or *milk-rice* (*vide supra*), and the other in flasks with long necks and two flat sides on gelatine, agar-agar, and blood-serum. These cultures are sealed with close-fitting tops and paraffine, and remain latent for an indefinite time—two years and a half under observation. Soyka claims these advantages, all of which will be readily conceded if the method be at all successful: (1) possession of specimens for demonstrations; (2) the existence for a long time of pure, unchangeable material for inoculations; (3) the fixing of the duration of the latent life of the organisms; (4) possibility of creating the most intense processes of growing, and of observing the same for an indefinitely long time.

*Bacteria of Nail-Dirt.*—Under this not very attractive title Mittmann<sup>20</sup> has studied the number and varieties of micro-organisms to be found beneath the nails of persons in various employments. The results are interesting, both from a scientific point of view and in connection with that other bacteriological work showing how extremely difficult it is to really sterilize the hands. Out of twenty-five experiments on material obtained from cooks, barbers, waiters, etc., he obtained seventy-eight varieties of bacteria, of which thirty-five were micrococci, twenty-one diplococci, eighteen rods, three sarcinæ, and one a yeast; all of which goes to show how extremely careful one must be in cleaning out any foreign material from beneath the nails before undertaking any operative procedure.

*Pneumoenteritis of Pigs.*—Cornil and Chantemesse<sup>46</sup> have made some interesting observations upon the organism concerned in the production of this disease, which disease they consider to be the "Schweine-Seuche" of Löffler and Schütz, and the swine-plague and hog-cholera of Salmon. The whole subject of this disease is, however, in confusion, and will remain so, especially upon this side of the water, until the commission appointed

by the United States Government to settle the justice of the claims of Billings to accuracy in his work has finished its labors.

*Pathogenic Parasites.*—In the rush toward bacteriology proper the influence of parasites upon man and animals has been to a certain extent cast in the shade. It is with much interest, therefore, that a paper like that of Pfeiffer <sup>58</sup><sub>Aug. 23</sub> is read, in which is a very complete study of the evolution, occurrence, and structure of the smaller of these pests, together with a literature and synopsis of cases observed. Our space is too limited to allow us to do more than notice this very excellent work.

*Bacteria in Sick-Rooms.*—Neri <sup>708</sup><sub>Apr.</sub> finds as the result of his experiments in hospital wards that bacteria do not occur in the lower strata of the air, but begin to make their appearance at about the height of the sick-bed, their number apparently increasing to a height of about a metre and a half. He found sixteen kinds of bacteria—eight micrococci, two streptococci, five bacilli, and one micrococcus of septicæmia. His researches indicate that a change should be made in the methods of hospital ventilation—that the current of air should be directed from below upward, instead of from above downward.

*Bacteria in Saliva.*—Many investigations have been made upon this subject, the most important of which (recently) are those of Netter, <sup>3</sup><sub>Dec. 20, '97</sub> who has found the bacillus of Friedländer in the saliva of healthy persons; and in another communication <sup>3</sup><sub>July 25</sub> he has succeeded in demonstrating the presence of the streptococcus pyogenes in the same situation, as well as Fränkel's bacillus of pneumonia.

*Suppuration.*—Of course, the question of the cause of suppuration is an extremely important one, and it has been supposed to be settled that this process does not occur without the active agency of bacteria. The subject has been reopened, however, by Christmas, <sup>202</sup><sub>Sept.</sub> who claims to have produced a true suppuration without the presence of bacteria by the inoculation of chemical substances. Arloing <sup>211</sup><sub>May 13, Aug. 12</sub> speaks of a "*substance phlogogène*" which he finds in the culture fluids and natural fluids in which certain bacteria have grown, whilst Leber <sup>22</sup><sub>Oct. 24</sub> has found a substance producing the same results in the fluids in which the staphylococcus pyogenes aureus has grown. The subject is an important one and needs still further investigation.

*Resistance of the Skin to Bacteria.*—This very important element in the etiology of bacterial diseases is treated at some length critically and experimentally by Roth,<sup>58</sup><sub>Id., p. 11</sub> who used various media (lanolin among others) for carrying the bacteria through the skin or mucous membranes, with the result of showing that occasionally the organisms could be taken through these tissues with no apparent lesions of them.

*Tuberculosis and Typhoid Fever.*—No marked advance in the study of the etiology of these two very important diseases has been made in the last year, although a number of interesting and important papers have been published, each one of which marks a step forward. Perhaps the most important of these is that of Cornet,<sup>58</sup><sub>Id., p. 191</sub> upon the dissemination of the bacilli of tuberculosis outside of the body, in which many important results are obtained and suggestions made as to prophylaxis. The article is very carefully written and deserves the thoughtful consideration of every one interested in preventive medicine. (See sections A and H, vol. i.)

*Virulence.*—What it is and what it is caused by is treated very elaborately by Bouchard,<sup>92</sup><sub>July 10</sub> and Dujardin-Beaumetz.<sup>17</sup><sub>July 8</sub> The former concludes his remarks with this sensible advice: "Watch the microbe, but do not forget the animal organism and its reactions. Despite the importance of the recent acquisitions in bacteriology, rest well assured that medicine still is and always will be left to us," whilst the latter sums up his conclusions by saying that "virulence is the resultant of the relative vitality of the infectious agent and the infected organism; and it will be more or less according as the latter is greater or less able to destroy or to eliminate this infectious agent."

*Water.*—Bacteriological tests of water are frequently made, and the following conclusions reached by Bischof,<sup>2</sup><sub>Jan. 7</sub> will be of great interest: 1. No bacteriological water test can satisfy the demands of hygiene unless it is qualitative, distinguishing between harmless and pathogenic microphytes. No such test is at present known. 2. Merely numerical results without such distinction are entirely unintelligible, unless the time and other conditions of each test be specified. 3. A small portion only of the colonies capable of growing in gelatine peptone is indicated by three days' culture. 4. The ratio of colonies thus indicated by three days' culture to that of the total present appears to differ so widely in

different samples that the numbers of colonies obtained from them cannot be compared with each other. 5. Instead of any such comparison the changes taking place from time to time should be followed up in each sample separately. 6. Extension of culture beyond three days increases the reliability of the results. How far this holds good and how far culture should be extended we have at present not sufficient evidence to show. 7. The usefulness of results is probably still further increased by combination of extension of culture with storage in sterilized flasks for a certain time. 8. As regards the control of the working of sand filtration at water-works, any bacteriological test to be of practical utility should be repeated at intervals, certainly not exceeding a fortnight. 9. It is desirable for the purpose of such control to test the water entering and leaving each filter.

*Yellow fever* has again been a bone of contention in the past year. The mission of Sternberg<sup>9</sup> to Brazil to investigate the claims of Freire to have discovered the organism producing the disease and a method of protective inoculation against it resulted in an adverse report to this scientist's claims. This report has called forth an indignant remonstrance and protest from Freire, which is certainly very strongly worded. Gibier has been sent to this country by the French Government to study the disease more fully, and Sternberg's work is to be continued. As a whole, however, little that is satisfactory has as yet come from it all. (See *Yellow Fever*, section H, vol. i.)

#### PTOMAINES.

These alkaloids have obtained so much prominence of late in connection with the development of bacteria and the process resulting from this growth, that they demand a separate consideration. They are, as everybody knows now, the results of the retrograde metamorphosis set up during fermentation, and resemble in character and composition the vegetable alkaloids. They are, in fact, true animal alkaloids, and as many of them are produced during life by the normal cell activity in the animal tissues, as well as by the cell activity of the ferments, there are two great classes now recognized. One of these has received the name "ptomaines," referring especially to those alkaloids which are the result of fermentation or putrefaction after death, whilst the name

“leucomaines” is given to those which are found during the life of the tissues in which they occur. It seems to be more and more evident that a large part of the activity of the pathogenic bacteria is due to the formation and toxic effects of these alkaloids, and their study will very probably give as important results as have already occurred from the study of their producing factors. They are, however, exceedingly difficult to handle, being for the most part of very unstable chemical composition, and it is without doubt the case that the chemical manipulation employed in separating and studying them produces changes of original character in at least some of the most volatile. Some of these alkaloids are toxic and others not, but perhaps the most common characteristics of them all is a greater or less acidity. The subject, as far as at present understood, is fairly well presented as a whole in Vaughan and Novy's book.<sup>1192</sup> One decided objection should be made to it, however, the suggestion that bacteria may be the *products* of these alkaloids, which is simply a revival of the old idea that living organisms may be generated from lifeless material,—a theory that has to-day no scientific evidence whatever as its support. Of the individual work upon these alkaloids it is not necessary to say much, for the reason that, as important as it has been, it is furnishing the steps necessary for a great advance in our knowledge only, without, as yet, arriving at anything near completion.

#### PHAGOCYTOSIS.

This theory of Metschnikoff has attracted a great deal of attention and much work has been done upon it; the principal criticisms against it have been formulated especially by Weigert<sup>54</sup><sub>Nov.1</sub> and Baumgarten.<sup>114</sup><sub>Bm.15, H.1, 2</sub> The theory, briefly stated, is that the white blood-corpuscles and other mesodermal cells devour and digest pathogenic bacteria entering the body. Because of the objections of the authors mentioned above, it became of importance to determine the preliminary question: Do the phagocytes digest bacilli, and are they the only tissues that do? This has been attempted, and not only by the authors quoted, but by others, and especially by Flügge, Bitter, and Nuttall.<sup>58</sup><sub>Bm.4, H.2</sub>

If a portion of the bacilli that enter the system die off or are destroyed before coming in contact with the phagocytes, not only is the importance of the latter rendered doubtful, but the assumption

is not remote that they destroy only degenerated bacilli—that they are only “crematories,” as it were. The various researches showed that the leucocytes took in and devoured “large quantities” of splenic-fever bacilli, but also that quite as many, if not more, became completely degenerated outside the phagocytes. This fact, which was determined with certainty both on frogs and warm-blooded animals, led to the assumption that the agent inimical to the bacilli was really to be sought in the fluid around the cells. This assumption increases in probability from the fact further ascertained that in fluids poor in leucocytes, such as the fluid from the pericardium and the aqueous humor, degeneration of the bacilli rapidly set in. From all this, therefore, it is quite evident that it still remains to be seen what the agent is which is active in destroying bacilli.



## EMBRYOLOGY, ANOMALIES AND MONSTROSITIES.

BY W. XAVIER SUDDUTH, M.D., F.R.M.S.,  
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THE improvement in microscopical technique is beginning to have a marked influence in the exactness of embryological research, and many investigators are now going over the entire field with promise of results far more reliable than those of the past.

Improved methods of preserving and staining tissues lead to better demonstrations of the points of supposed difference. The use of photography has, in many laboratories, to a great extent superseded the tedious methods of drawing with camera lucida, and at the same time has eliminated the "personal equation" which has so long hindered unbiased conclusions. The discoveries of karyokinetic changes are now just beginning to bear fruit and to influence the deductions in studies on the formation and regenerative changes in tissues. No line of research yet undertaken is of more importance to the ordinary practitioner than the effort to obtain an exact knowledge of the inceptive force governing the functional and physical changes taking place in the system.

Though we are still unable to point out this hidden force, yet marked advance has been made in our knowledge of the *modus operandi*, by which progressive and retrogressive changes occur.

C. O. Whitman<sup>248</sup><sub>Am.</sub> gives a lucid and exhaustive review of the literature on the rôle played by the cytoplasm in the development of tissues. The location of the formative force is fully discussed, and while admitting the weight of authority with regard to the influence of the nucleus upon the secondary changes that take place in cell divisions, he holds that "the hypothesis of reciprocal action is not incompatible with the opinion that the conditions of this action are furnished in the first instance, if not continuously, by changes of a chemical or molecular nature, which arise independently, either in one factor alone or in both. He also maintains that no form of correlation exists between nucleus and cytoplasm. The nucleus, except during the process of division,

seldom varies from the oval or round form, always returning to its original shape. The cytoplasm, on the other hand, assumes the globular or the oval form as seldom as the nucleus departs from it.

Such, too, has been my own observation. The tendency of all protoplasm when left free is to assume the spherical form, and I believe too much stress has been laid on the shape of cells. The variations in the form of different cells of the same class is simply due to the pressure of fellow-cells, and, consequently, has little or nothing to do with determining our conclusions as to their functions.

Whitman further says <sup>248</sup><sub>Aug.</sub>: "Every step in advance only brings us to a keener sense of the subtle and incomprehensible nature of the force or forces contemplated. We see the effects only imperfectly, and are baffled in every attempt to understand the mode of action." He also treats of the subject of heredity in its influence on the developing organism, holding that "the cells reflect in some way in their chemico-physiological constitution all the typical structural features of the parent organism." Carrying our knowledge of the influence of environment on organized bodies into our studies on development, it becomes easy to hold with Pflüger that the isotropic character of the amphibian egg and the regularity of reproduction of kind depends not so much upon heredity as upon the similitude of external surroundings, whereby the controlling agency works to reproduce the similarity in results. But if such were true we should find that the mother influence would predominate throughout nature. This, however, is not the case; hereditary traits of character and form are copied from the father as well as from the mother.

Aprôpos of this subject, A. Nagel <sup>29</sup><sub>Bd. 31, p. 3</sub> gives an exhaustive *résumé*, together with the results of his own researches on the development of both human and other ova. His studies on human ova were made from ovaries removed in laparotomy operations for pelvic inflammations in Professor Gussacrow's clinic. He examined the ova in their own fluid on the warm stage. So handled, they retained life surprisingly long, and enabled the observer to note the changes that took place in the nucleus, and also the amœboid movements of the ovum itself. Such studies could not have been made in years past, before the castration of women for neuralgic and other affections of the generative organs was adopted. Nagel, of course, had to establish some rule for

comparison as to the condition of health of the ova under examination, and as a sufficient number of known healthy human ova had never been examined in this condition to determine a standard, he depended upon the Graafian follicles. His observations do not bear out those of Grohe, who held that the ova develop by cellular division. He failed to find in foetal ovaries ova that showed molecular divisions, and in only two instances did he observe ova with two blastodermic vesicles. Nagel maintains that the ova are developed from the germinal epithelium and not from the stroma or the medullary cells. The size of the ova are in comparison to the size of the individual. In fresh ova taken from the ovary he could discover two distinct zones in the yelk which were not observable in the hardened specimens. He noticed in the central portion of the ovum coarser and finer granular particles, but could not make out any organized elements, such as Benedin described as seen in the *Ascarides megalocephala*.

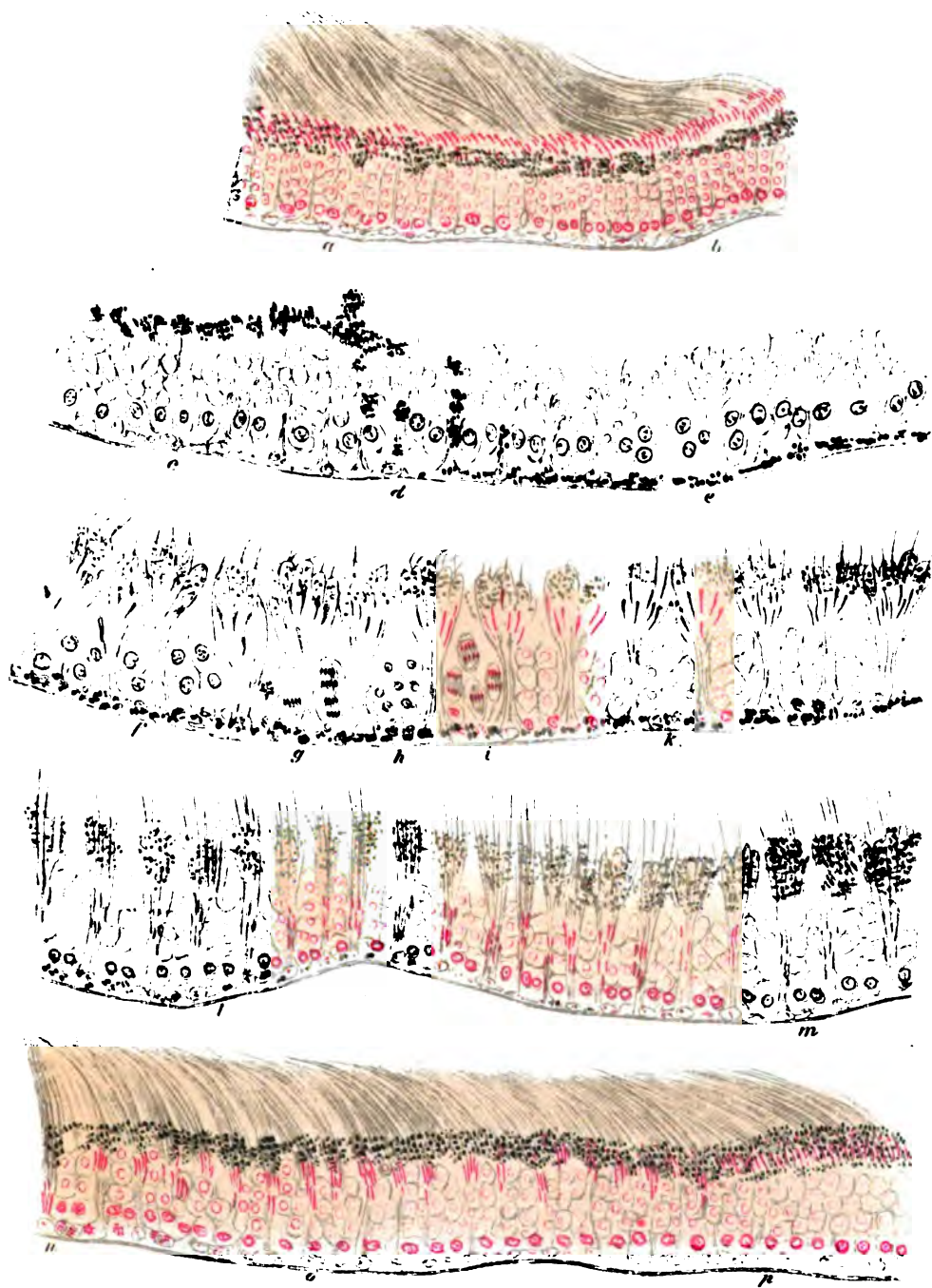
Ova taken from a woman twenty-one years old, who had menstruated regularly, and on whom the operation was performed four or five days before her monthly period, showed two highly refractive bodies entirely disconnected from the germinal vesicle. His observation was corroborated by Waldeyer. The same phenomenon was seen in two other ova taken from the same woman.

With regard to the spermatozoa, the work of W. Flemming, of Kiel, <sup>29</sup><sub>Dec. 15, '97</sub> and that of V. V. Ebner, of Gratz, <sup>29</sup><sub>Apr. 16</sub> is so good as to require much more notice than is here possible. Flemming's researches were confined to the salamander, Ebner's to the rat.

As the results of his observations, Flemming draws the following conclusions: 1. The heads of the spermatozoon in the salamander are developed from the nuclei of the "spermatidin" cells. The last term he uses to designate the layer of cells latest developed by division of the parent cells. The division of the spermatidin cells occurs so that the chromatin of the parent cells may pass into the highly stainable spear-shaped heads of the spermatozoa. He is not positive as to whether the achromatic wall of the head is formed from the achromatic portion of the nucleus or not. 2. The development of the stainable portion of the head results from a prolongation and general thickening of the fibrillated parts of the nucleus. 3. As soon as the spermatozoa are freed from the parent cell they shorten by contraction of their elastic elements.

4. The thickening of the spermatidin cell at one end predestines that portion to form the posterior part of the head. 5. The primary formation of the middle portion is more or less chromatic, thus pointing to a nuclear origin, and that, too, from the nuclei of the parent spermatidin cells. Flemming has not been able to differentiate any accessory or secondary nuclei that take part in the formation of the spermatozoa. 6. The tail fibril appears to be a continuation of the nuclear substance. 7. It is tenable to maintain that the tail fibril is formed from the nucleoli of the parent cell. 8. The development of the spermatozoa in the salamander progresses from one portion of the testicle to the other. 9. The development of the spermatozoa begins in a depression at the base of the spermatocyst. At first the arrangement is irregular, consisting of the lengthened parent cells. These, however, form later in rows, parallel with the tail and extending to the outer side of the cyst-wall. 10. There appear before and between the heads of the bundles of spermatozoa small chromatic granules. 11. The fully ripe sperm may be differentiated by staining with safranin. 12. The observations made by V. Wichterberg as to the phenomena present in the triton are correct, but he has drawn illogical conclusions therefrom. He took the antecedent condition for the developmental stage, and the true form of development for a degenerative condition.

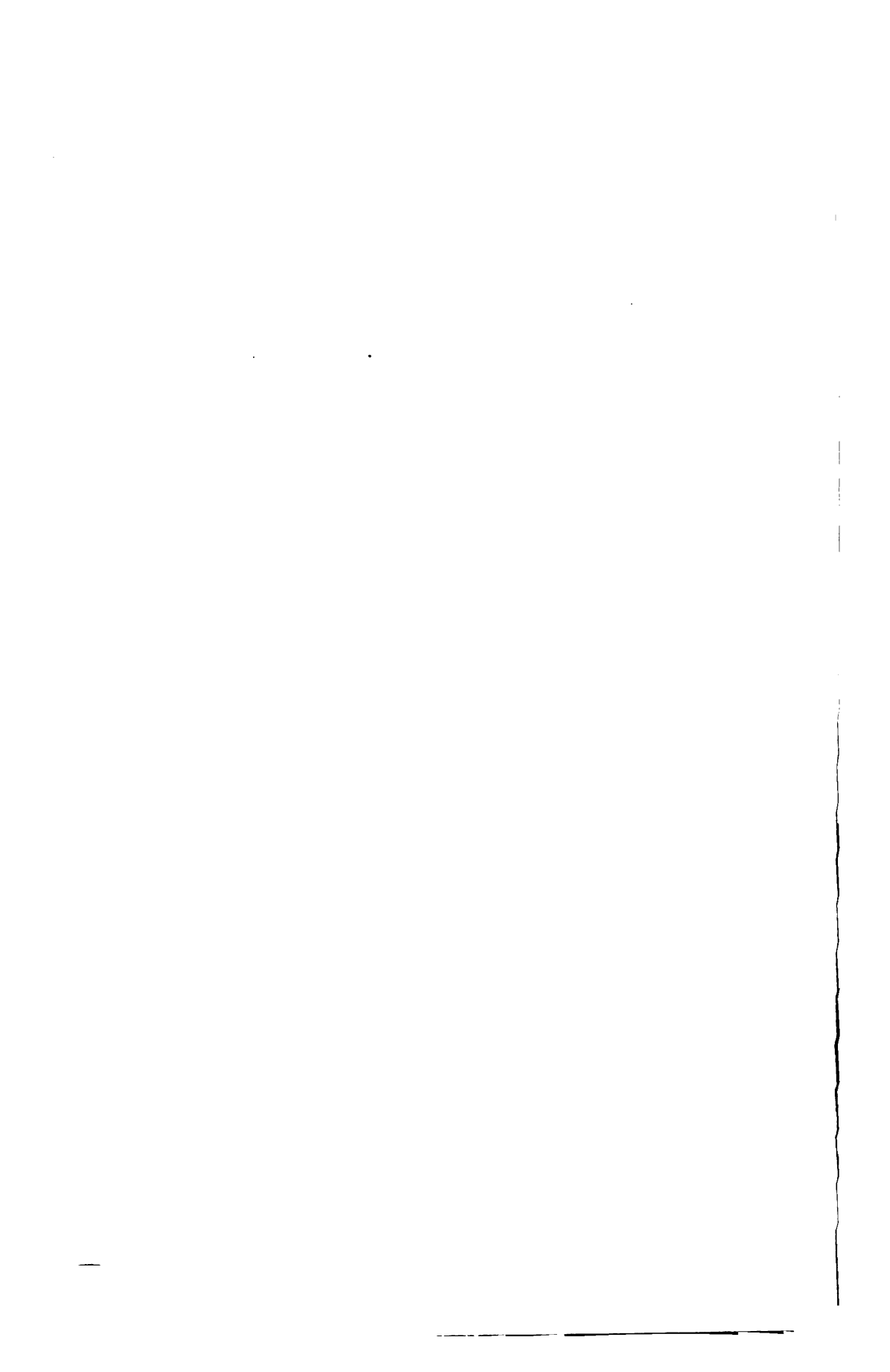
Ebner <sup>29</sup><sub>Apr. 14</sub> returns to the study of the subject after seventeen years, and finds that by improved methods much more can be made out of it than was formerly possible. His conclusions may be summed up in his explanations of the accompanying plate: Figs. 1 to 5 show a longitudinal section through the axis of a seminiferous tubule, stained with safranin, the specimen having previously been hardened in Flemming's fluid. The fine drawings give the principal phases of a cycle in the developmental process of the spermatozoon, though the portion shown represents not more than one-tenth the space occupied by the tubule. Both the measurements and the general outline were made with the camera lucida, the details, therefore, are somewhat diagrammatic. Fig. 1, (a) at the upper part in the axis of the tubule are cast-off spermatozoa, between the heads of which are seen the black-stained fat-drops and the red-stained granules; (b) the heads of the spermatozoa more separated from the fat-drops and the granules. Fig. 2, (c) the



Buchholz & Fiedler - Lith. Pluta

## Spermatogenese Folie 2

Anatomische Mikroskopie und Anatomie



spermatozoa have disappeared, and only the granules are to be seen. Those at (*d*) are undergoing absorption by the cells of Sertoli. At this point can also be made out the formation of the spermatoblasts; while at (*e*) is shown the elongation of the nucleus in the process of development. Fig. 3, beginning separation of the seminal granules in the folds of the spermatoblasts, which are plainly aggregated in the basement portion at (*k*); throughout the entire field are dark-stained fat-drops; (*g*) the beginning of the cells of Henle; (*h*) the quiescent stage following; (*i*) the second occurrence of division of the cells of Henle in the position heretofore occupied by the spermatoc cells, while at the same time a new generation of the cells of Henle is thrown out from the wall of the canal. Fig. 4, collection of larger fat drops, stained black in the folds of the spermatoblasts, while the fat in the basement layers at (*i*) has markedly diminished, and at (*m*) has entirely disappeared. Fig. 5, (*n*) beginning of the process of the shedding of the spermatozoa, segmentation of the cells of the wall of the tubule; at (*o*) the large fat-drops still situated about the heads of the spermatozoa and the first appearance of the large stainable secondary granules; (*p*) completion of the process of the shedding of the spermatozoa.

Boveri<sup>34</sup><sub>Aug. 21</sub> discusses the interesting question with regard to the influence of the spermatozoa on the division of the ovum. After thoroughly reviewing the theories advanced by Weisman and Ischikawa in the light of his own observations upon the daphnidian ova, he concludes that the chromatic portion of the nucleus plays an important part in the transmission of hereditary tendencies, and that to this part sufficient importance has not been attached in the past.

Following out our serial reviews of the work presented during the year, we next notice the paper by Van C. Kuppfer<sup>34</sup><sub>July 21</sub> on the human decidua and ovum at the end of the first month. The membrana chorii was found to be from 0.08 to 0.1 millimetre in thickness, shaped so as to fit into the horns of the uterus and the conical cervix. The decidua serotina occupied fully one-fourth of the chorion. He is positive that no glands opened into the cavity of the amnion. He showed that though many of the uterine glands were inclosed in the decidua serotina, yet they opened into the uterine cavity, and there was absolutely no relation between the chorionic villi and these glands.

Jerome A. Anderson<sup>27</sup> sums up an interesting paper on the nutrition of the fœtus *in utero* by the recital of a case in practice. In this instance, through the laceration of the membranes and the consequent daily loss of the liquor amnii, the mother was, at the end of the seventh month, so exsanguinated that he was compelled to induce premature labor. He claims that this case proves that the nutritive substances in the amniotic fluid are directly traceable to the mother, and that the presence of the nutriment in the amniotic fluid was evidence *per se* of its function; the absorption of the liquor amnii by the glands of the skin, the permeability of the digestive tract at an early period in development, and the necessary entrance of the albuminous amniotic fluid *per orem*, according to the well-known laws of hydrostatics, the presence of meconium in the bowel at birth, all tending to establish the reasonableness of the theory.

Adolph Törngren<sup>28</sup> Aug presents a classical memoir on the subject of the interchange of soluble substances between mother and fœtus. His experiments, seven in number, made in the laboratory of Strauss, were performed with a view to determine as to whether medicaments introduced into the circulation of the mother passed into that of the fœtus. He draws the following conclusions: 1. That the absorption of the amniotic fluid by the vascular system of the mother (rabbit) takes place during gestation. 2. That absorption is performed either by the placenta or the membranes. 3. That the stomach of the fœtus at the end of gestation has absorptive power, but that absorption does not essentially contribute to the changes between the amniotic fluid and the blood of the mother. 4. That the soluble substances in the mother's blood pass into the amniotic fluid generally through the placenta.

La Torre,<sup>3</sup> Sept. 13 treating of morbid hereditary influences upon the development of the fœtus, says that the development of the fœtus depends, in the majority of cases, not upon the health of the mother, but that of the father; that when the father is diseased the development of the fœtus gives response accordingly. From the cases of alcoholism, syphilis, and pulmonary phthisis examined he draws the following conclusions: 1. If the father is given to drink the development of the fœtus is retarded. 2. Consumption in the father affects the development of the fœtus. 3. A fœtus, the offspring of a syphilitic father, if born at full term, is apt to be small.



In short, whenever the father is affected by a constitutional vice, his offspring shows signs of imperfect development, it matters not what the condition of health of the mother may be. This imperfect development is shown by the weight of the child at birth.

H. Ernest Zeigler<sup>29</sup><sub>Oct. 17</sub> discusses the subject of the development of the mesenchyme—mesamœboids (Minot) in *selachians*. According to the latest observation, these cells arise not from the mesoblast, but outside of the real tissue of the embryo. His observations fully substantiate those of Haddon and Minot as regards the precocious development of this tissue, being synchronous in many instances with segmentation and gastrulation. He concludes that in the regular course of phylogenic development, in the position occupied by the mesoblast there remains an undifferentiated cell mass which gives rise to the mesenchyme.

Charles B. Lockwood, in his lectures<sup>2</sup><sub>Apr. 7</sub> before the Royal College of Surgeons, considers the development of the organs of circulation and respiration. He says that there is no evidence to prove that the umbilical veins of the human embryo empty directly into the heart, although the observations of His make them open into the sinus reuniens, a cavity very similar to the cardiac end of the omphalo-mesenteric vessels of the rabbit. Specimens were exhibited which seemed to prove conclusively that the evolution of the other great vessels differed in no respects from those of the rabbit.

F. La Torre<sup>162</sup><sub>Mar., June</sub> presents the results of an extended clinical experience upon the influences affecting the normal development of the human embryo. He deals with generalities which do not come within the scope of this work.

W. Roux<sup>20</sup><sub>Oct., Nov.</sub> contributes a very interesting treatise on the developmental process in the embryo. As a sequel of the destruction of either one of the original cells in segmentation of the ova in the "two-cell" stage, he found it possible to produce a half embryo as a result of interference in the normal development by piercing the blastula during gastrulization.

His observations were carried on with such nicety that he could produce almost any malformation desired; for instance, interference after the fourth stage in segmentation had occurred would produce an embryo in which one-fourth of the body would fail to develop and result in the absence of one side of the head. The development of the gastrula and the subsequent development

of the embryo is in the form of a mosaic, division occurring in at least four directions in separate axes. In some instances the wounded portions would heal, the reorganization resulting from the nuclei which had wandered into the yolk substance; the renucleization of the destroyed portion resulted, later, in cellulation, each nucleus becoming the centre of a perfect cell. The re-formation was not, however, always complete and generally resulted in a considerably modified portion of the embryo, the regeneration was more than delayed, development was not regular, and the cells were irregularly arranged. He holds, therefore, that the different portions of the ovum have an entirely separate influence on the developmental process.

George W. Jacoby<sup>1</sup> discusses the probable source of the nervous system, considering the subject from a synthetical rather than an analytical stand-point. He suggests that if we start from the premise that originally all embryonal cells as they arise from segmentation are of equal value, then the thesis may be sustained that all three layers, potentially, also possess the capability of transformation into all tissues, but, on account of certain morphological conformations, do not manifest this power everywhere. All observers, without exception, admit the fact, shown first by von Baer for the vertebrates and by Kowalewsky for a large number of the invertebrates, that the central nervous system is an offspring of the epiblast, which is considered epithelial in nature and which, beyond a doubt, also produces the epidermis of the skin, its appendages, etc. Only in the batrachians has Stricker seen a separate layer beneath the epiblast, from which he maintains that the central nervous system is derived.

It is his conviction that the history of the development of the central nervous system is intelligible only upon the following grounds: (1) that its earliest stage is a depression of the epiblast in concordance with depressions of the surface layer of lower organisms for sensory perceptions; (2) that the central nervous system, being an offspring of the epiblast, is epithelial in its origin and so remains only for the earliest periods of embryological development; and (3) that the original epithelium passes into a stage of morphological indifference, in which it remains during life, composing the gray substance of the central nervous system.

My observations upon the development of the nervous system

lead me to differ with the now generally accepted views regarding the differentiation of nervous tissues. A careful study of the development of the inferior dental nerve with its branches, which extend into the pulps of the teeth, cannot fail to convince one of the origin of nerve-tissue from the ordinary cells, connective-tissue group. The dental nerve comes to occupy the central portion of the inferior maxilla, the body of which is developed beyond question from mesoblastic tissue. Epiblastic tissue is only found in the enamel organ in the jaw, and the nerve-fibres found in the mature pulp are doubtless a differentiation from the connective-tissue papilla which serves as the formative organ of the tooth. These are true nerve-fibres, but they are not present in the early stages of tooth development, and even after the body of the inferior dental nerve is developed and shows plainly its fascicular arrangement, no nerve-tissue can be found in the tooth pulp. It is not until the tooth is almost completely formed that nerve-fibres can be demonstrated in the pulp. These are non-medullated, and it is barely possible that the medullated and non-medullated fibres have separate sources of origin.

Josef Schaffer, of Gratz,<sup>29</sup><sub>Oct. 17</sub> makes the subject of maxillary ossification the text for an elaborate thesis on the disputed points in regard to the nature of the process of bone development. He discusses quite fully the theories of transformation and substitution. His studies were made upon the inferior maxillary of foetal lambs, giving particular attention to the nature of ossification of the coronoid and condyloid processes. In the smallest embryo studied (foetal lamb two centimetres long) he found no indication of ossification, only a complex arrangement of embryonal corpuscles, which later took a wider separation by the accumulation of intercellular protoplasm. (*Grundsubstanz.*)

The inferior maxillary assumes a circular form, being inclosed by an embryonal membrane (epiblast). In the centre, in cross-sections, can be seen Meckel's cartilage. The first indication of bone formation was found in embryos from three to four centimetres long, and appeared as a curved lamella situated between Meckel's cartilage and the alveolar nerve-bundles above referred to. The concavity of the lamella was upward and inclosed the inferior dental nerve. Lateral lamellæ were also later observed extending posteriorly, forming with the horizontal lamella a continuous layer which

inclosed Meckel's cartilage. Regarding the origin of the osteoblast in provisional bone, Schaffer says that in the axis of the condyloid process, where later primary bone-lamellæ will appear, are seen the formative bone-cells (osteoblasts), which are none other than the formative embryonal corpuscles irregularly distributed in the basement substance (intercellular protoplasm), which appear, not homogeneous, but interspersed with numerous pale lines.

It seems strange that Schaffer has not dwelt more upon the peculiar manifestations found in the process of ossification as seen in the anterior portion of the inferior maxillary, scapular, and malar bones, for in my view of the case the process is much easier of elucidation than in the more complex presentation as found in intra-cartilaginous ossification. I have given considerable attention to this subject, and think that in the description of the earlier stages of ossification a new classification is needed; and I have therefore introduced the term <sup>1109 462</sup><sub>p.400; V.3</sub> "interstitial" ossification, as relating to that form of bone development that occurs in the inferior maxillary, scapular, and malar bones, and which is found previous to ossification in other portions of the body.

Interstitial ossification is a premature expression of bone formation. It develops contemporaneously with the cartilaginous system, and may be said to be "provisional" in character, in that respect resembling cartilage. The latter is the matrix or mould which serves as the antetype of the mature product, and the same can also be said of interstitial bones. The fœtal jaw, the best defined instance in the latter process, is as truly the antetype of the mature jaw as the fœtal femur, performed in cartilage, is the pattern or matrix that shapes the mature femur. In the fœtal jaw even the form of the alveoli, microscopic in size, can be made out inclosing a microscopic dental follicle, the mature product in miniature. The malar bones and the clavicle are developed in a manner similar to that of the maxillæ, and for each there forms a matrix around which the mature product is developed. It is to the special manner of development of the maxilla, clavicle, and malar bones that I would call attention.

The malar, premaxilla, and superior maxilla are not prefigured in cartilage, and ossification begins in them prior to the formation of membranes or cartilage in other parts of the body. The inferior maxilla and clavicle are prefigured in cartilage, but

the cartilage plays little or no part in the ossification of these bones, although their articulating ends are developed by intracartilaginous ossification. My attention was first directed to the need of an additional classification while studying the development of the jaw, and I was surprised upon looking up the literature on the subject to find no reference made to the manner of development of these bones.

The ossification of the human clavicle is dismissed in the following curt manner by Foster and Balfour<sup>1110</sup>: "The clavicle in man is provided with a central axis of cartilage, and its ossification is immediately between that of true cartilage bone and membrane bone." Regarding the ossification of the inferior maxilla, there is, so far as I am acquainted with the literature, only one illustration that has been published with a view to showing the earliest stages of maxillary ossification, and this<sup>1111</sup> is taken from an almost mature foetus. Judging from the paucity of literature and illustration on the subject, one is naturally led to infer that the earliest steps in bone formation have not been so thoroughly worked up as the later forms of ossification.

The first indication of bone formation in the body is found in the clavicle and the malar bones. In man this occurs about the beginning of the second month, sometimes earlier. Ossification in the maxilla follows shortly afterward, the inferior maxilla slightly preceding the superior. Next in order the membrane bones of the skull develop; after which intracartilaginous and subperiosteal ossification supervenes. The connective tissue of the mesoblastic layer, when ossification in the clavicle and the malar bones first makes its appearance, is still decidedly embryonic in character. There has been no attempt on the part of nature to differentiate periosteum or membrane.

The description was mainly confined to the phenomena as seen in the superior maxilla, they being analogous to and concomitant with the several phases of the process as observed in the clavicle and malar bones. Surrounding the central cartilage of the inferior maxilla, the now more or less fibrillated connective tissue was seen to be deeply stained in well-prepared specimens. The proportion of connective tissue to cartilage was as ten to one. The cartilaginous band does not increase in size, but the connective tissue develops very rapidly. In the central part of the connective

tissue of the inferior maxilla, on the outer side of Meckel's cartilage, the ossific points first make their appearance. These are seen in specimens stained with hæmatoxylin and eosin, as groups of oval and round cells that are more deeply stained than the remainder of the embryonic connective-tissue cells. Except for the darker stain taken and their somewhat increased size, they fail to present any points which, under a low power, will differentiate them from the surrounding cells. Under a high power they do not show the same fibrillated appearance seen in the ordinary connective-tissue cells, and in this latter respect they more nearly resemble the plasma cells of older tissue.

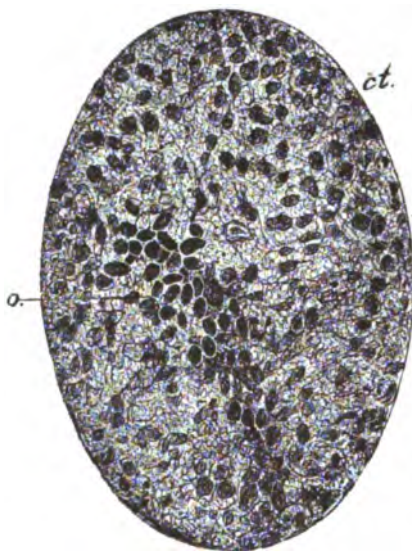


FIG. 1.—INFERIOR MAXILLA PORCINE EMBRYO  
( $2\frac{3}{4}$  CENTIMETRES  $\times$  240). (Sudduth.)  
o, odontoblasts grouped together and surrounded by embryonal  
connective tissue. ct.

It is a well-known fact that those cells which are youngest stain more deeply than older ones, and this is also true of the younger portions of the same cells. And again, cells, when in active function, stain more deeply than do the same cells when quiescent. Just what property such cells possess at the one time and not at the other which causes this difference we have not been able to determine, but that such a difference exists there can be no doubt.

These groups of cells, by this peculiar property of selection of stain, differentiate themselves, and in double-stained sections are especially conspicuous. This variation in shade was reproduced by means of photomicrographs, and is well shown in Fig. 1, together with the fibrillated condition of the intercellular protoplasm. By following out serial lines of studies in sizes ranging from this stage,—two and one-half centimetres in length, to three centimetres, four centimetres, etc.,—I was enabled to constitute a progressive series of steps in the development of bone, and can therefore say without any hesitancy that the groups of cells described were osteoblasts. They soon form themselves in

double layers, and the process of trabeculæ building begins. At this stage of development no bone-formation has occurred in the skull-cap; neither has intracartilaginous ossification begun. The development of provisional bone seems to be concomitant with the formation of the supporting cartilaginous structures, and to play nearly as evanescent a part in the further growth of the embryo as does cartilage. That the osteoblast found in this character of ossification arises from the ordinary embryonic connective tissue there seems to me to be no doubt. They are simply modified mesoblastic cells, endowed with special functionizing power. Sections through the face of a two months' human embryo shows the process of bone-formation in the region of the malar bones somewhat more advanced. There some osteoblasts are inclosed in shells of forming bone, which in sections at first have the appearance of bony spiculæ, but upon closer observation it will be seen that each osteoblast lies imbedded in a bony matrix, which it has secreted around itself.

As to the origin of the fibrillæ in intercellular protoplasm, Schaffer is not prepared to say whether they arise from the protoplasm itself or are simply continuations of the fibrillæ of the cellular tissue. My observations in this and other fields lead me to conclude that the protoplasm, unconnected with any influence directly arising from the nucleus, does become broken up into numerous fibrils in some instances, as in the case in hand, amounting to a dense net-work when observed with high power.

Schaffer says that on the surface of the developing bone the osteoblasts are thickly situated, with only a very small portion of intercellular substance between. It is seen that the embryonal corpuscles have not as yet begun to collect a cell-body, and nuclear division progresses rapidly, so much so that the jaw forms one of the very best portions of the mesoblast to study nuclear changes. Later, however, when calcification has somewhat progressed, it is very difficult to make out the karyokinetic figures.

Schaffer's examination agrees with mine in regard to the manner of the secretion of the lamellæ. Speaking of the appearance shown in specimens stained with hæmatoxylin, he says that the lamellæ are differentiated from the purple-stained osteoblasts by their yellow color and highly refractive appearance, and shows the intervening processes or bands quite plainly, by the formation

of which the osteoblasts become imbedded in the developing bone tissue. This peculiar arrangement is very distinctly shown in the accompanying cut, made by a photolithographic process from a photomicrograph (see Fig. 2).

Regarding the method of secretion, observation favors the substitution or secretion theory rather than that of transformation, and I think that a close study of the developmental process in serial lines of embryos will hardly fail to convince an unbiased observer. Regarding the varying forms assumed by depositing bone, it depends largely upon the character of the tissue into which the salts of calcium are deposited. In intramembranous ossification, bone is developed in long, narrow spiculæ. In subperiosteal ossification the forming bone is deposited in layers, which in turn inclose successive layers of osteoblast.

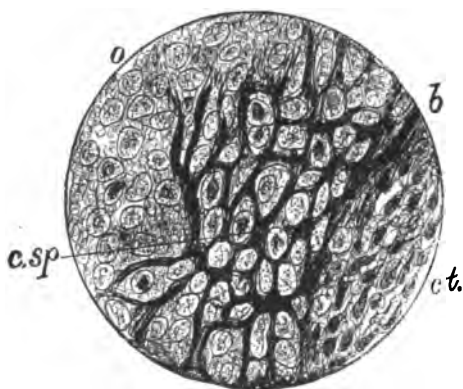


FIG. 2.—HUMAN FÆTUS 2¼ MONTHS (×250). (Sudduth.)  
a, osteoblasts; b, lamellæ of forming bone; c.sp., sections through the wall of the calco-spherules surrounding osteoblasts; ct., embryonal connective tissue.

In the development of provisional bone, occurring, as it does, in the central portion of the tissue, the secreted lime salts are deposited around the spherical osteoblasts, more or less in the form of spheres. The apparent spiculæ, when examined closely with high powers, reveal as many cup-shaped excavations

upon their sides as there are osteoblasts in lime. Under the superintendence of the osteoblasts a crescentic layer of true bone is deposited upon the side of the osteoblast, in apposition to a similar crescentic layer formed by an osteoblast located on the opposite side of the line. The sides of each crescent joins similar crescents formed by fellow osteoblasts on either side. As deposition progresses the osteoblast becomes encircled by a shell of bones. As the trabecula widens by inclosing the osteoblasts which lie upon its sides, new layers of osteoblasts are found arranging themselves on the walls, and they in turn become inclosed in a layer of bone. Thus, by the accumulation of successive layers of calco-spherules, the broadening of the bands of bone-tissue is accomplished (see Fig. 3).



The crescentic nature of the first part of the layer secreted by the osteoblasts is plainly shown where they are displaced or where they are considerably shrunken. As the process of secretion proceeds, the osteoblasts become inclosed in the formed material, designated by Rainey as calco-globulin. This shell of bone is pierced here and there by the fibres of the osteoblasts which are left as the latter shrinks. The deposition of bone is really in the meshes of these fibres. The body of the cell is spheroidal, hence the deposition assumes a spheroidal form; accordingly we denominate it a calco-spherule.

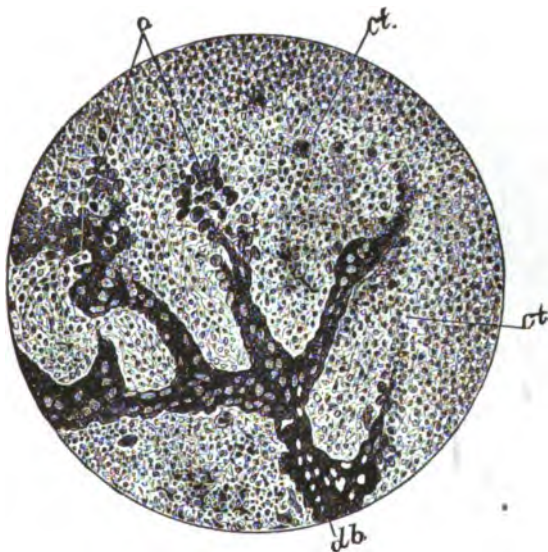


FIG. 3.—PORCINE EMBRYO (5 CENTIMETRES LONG  $\times$  250). (*Sudduth*.)  
o, osteoblasts situated at the ends of the lamellæ of bone; db., developing lamellæ of bone containing bone-cells; ct, embryonal connective tissue.

The evidence seems sufficiently plain, in primary ossification as above described, that the lime salts are deposited in the intercellular protoplasm and that the osteoblasts have an identity entirely separate from the basement substance in which the salts of calcium are deposited, thus forming the bony lamellæ. Schaffer thinks that the metaplasia or transformation theory, as applied to primary ossification, arises from the same source as the interpretation given the narrow bands that penetrate the cartilage beyond the ossification zones in intracartilaginous ossification. Even more inadmissible, says he, is the theory of Mosguelin, who holds that

the connective tissue is first directly ossified and then remodeled by the osteoblasts. This "connective tissue" is already bone substance and the cell osteoblasts. He makes a distinction between ordinary connective tissue and the tissue which forms the basis for primary ossification.

Regarding the special phases of cartilaginous ossification, Schaffer sums up his studies as follows: The inferior maxilla is early composed of bony capsule surrounding Meckel's cartilage, but having no direct origin in a cartilaginous process. The connective tissue in which ossification begins is embryonal tissue which, through cell proliferation and capillary development is formed into osteogenic substance, and the cells into osteoblasts. The new bone is thickly strewn with close-lying cells, stains similarly to cartilage, and has therefore been termed cartilaginous bone. The condyloid and coronoid processes early change the tissue type, and true hyaline cartilage is developed. In the ossification of the cartilage he finds two classes: the first, in which perichondrial ossification is seen, as in the coronoid process. No typical ossification zone is formed, but throughout the head of the condyle osteoclasts may be seen, and whole territories may be observed where the osseine cartilage is passing into cartilaginous bone.

In the second, or intracartilaginous form of ossification, which is a modified process in the condyloid process, may be observed a more or less perfect ossification zone and a more or less regular resorption of the calcified cartilaginous basement substance. The dissolution of the basement substance is due to the action of the capillary vessels. The cartilage has in the lower jaw a provisional importance in that it serves as a model for the developing maxilla. This has been markedly brought out in my studies, but my observations on the disappearance of Meckel's cartilage differ from those most commonly accepted, and are as follows: the cartilage becomes inclosed in a sheath of bone, which is developed in the surrounding embryonal connective tissue. As the deposition progresses, the cartilage is encroached upon, and being broken down under the influence of the osteoblasts, it becomes incorporated into the substance of the maxilla. The changes are shown very plainly in the accompanying cut (Fig. 4).

There is no proliferation of the cells, as in the head of the

femur, nor does Meckel's cartilage increase in size after the process of bone-formation begins. The process of ossification differs from that known as intracartilaginous, in that in the latter case there is rapid proliferation of the cartilage cells, the cartilaginous head of the femur increasing in size in proportion to the encroachment of the ossification zone.

This does not occur in the ossification of Meckel's cartilage. There is no increase of cartilage cells, except at the points of articulation, where true intracartilaginous ossification occurs. In the body of the jaw the cartilage simply becomes calcified, and after-

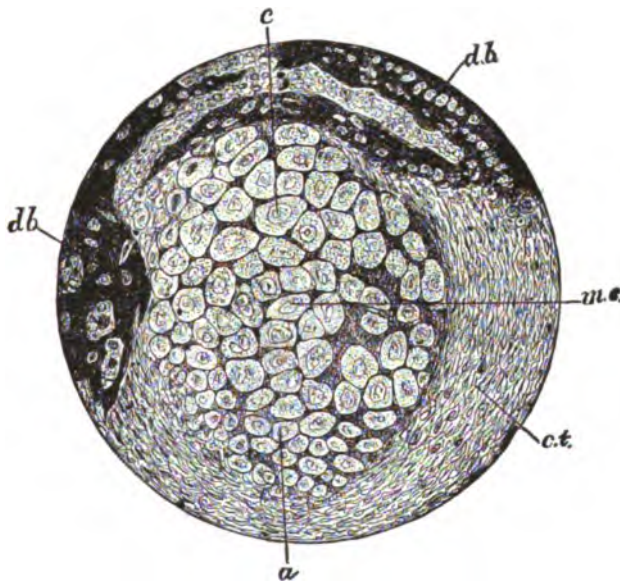


FIG. 4.—MECKEL'S CARTILAGE FROM JAW OF TWO AND A HALF MONTHS' HUMAN FŒTUS ( $\times 250$ ) UNDERGOING RETROGRADE CHANGES. (*Sudduth.*)  
a, normal cartilage cells; c, enlarged cells containing calcific material; db., d.b., developing bone; e.t., embryonal connective tissue.

ward ossified and incorporated into the substance of the maxilla, as before stated. It entirely disappears before the fifth month, not by wasting away, but by ossification. This change begins, as we have seen, at two and a half months. At three months it is almost complete, and at four months, in nearly every case which I have examined, no trace of the cartilage remains. In the pig it persists much longer, and is unaffected by ossific processes in embryos ten centimetres in length.

Schaffer concludes his observations as follows: "A true

metaplastic ossification is impossible; a genetic connection between cartilage and bone is, however, often brought forward because of the direct conversion of osseine cartilage into cartilaginous bone, two very similar tissues, which permit of no sharp distinction, morphological or histological, being made by stains and from which one readily establishes a connection; from the fact that young bone shows the same difference in the relation of its staining as is seen between young and old cartilage; from the great vascularity and highly irregular marrow formation seen in the coronoid process; from the fact that in perichondrial ossification the calcified cartilage is resorbed in a manner similar to bone by osteoclasts. Through the retention of territories of cartilage in fully formed bone, the configuration of the inferior maxilla is, from the preceding consideration, the result of apposition and resorption."

PLATE I.—Shows three sections of bone stained with safranin and drawn with the camera.

Fig. 1.—Perpendicular section through the coronoid process of an embryo fifteen centimetres long. *Kp.*, axillary cartilage nuclei with characteristic cartilage capsules; *kn*, already formed bone; *c*, cartilaginous head of process; *b*, blood-vessel.

Fig. 2.—Perpendicular section through the process. coronoid. of nineteen and a half centimetres embryo. *Kk*, position of the axis of cartilage, which is resorbed upon two sides; *kn*, developing bone; *ok*, osteoblasts; *o*, osteoblastic layer; *b*, blood-vessels; *s*, bright border-line of cartilage which, in the coracoid process, represents *ak*, the beginning of ossification.

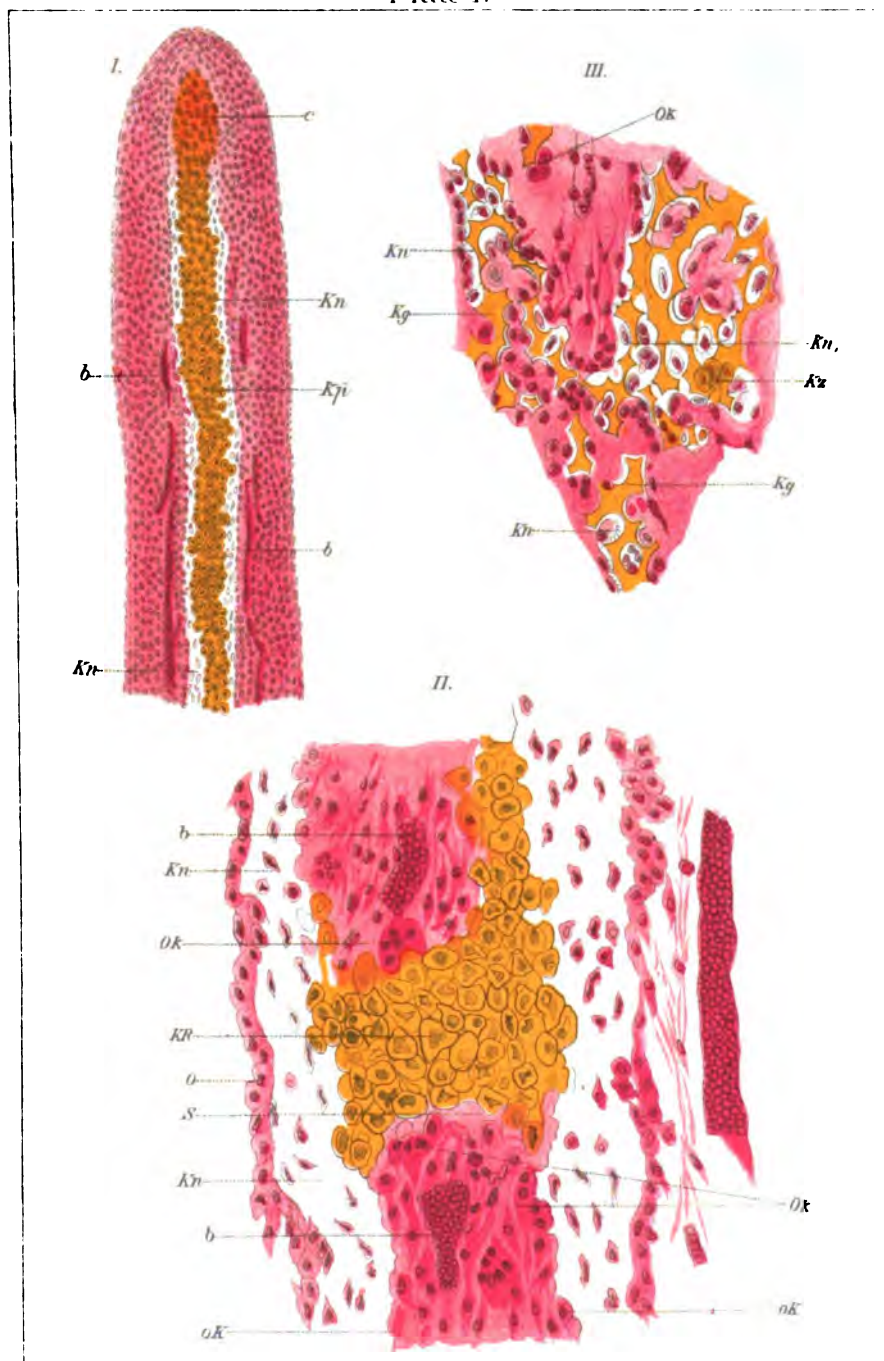
Fig. 3.—A perpendicular section through condyloid process of a twelve and a half centimetres embryo, showing the deeper ossific process. Remaining cartilage is stained orange. Bone unstained. Marrow tissues and osteoblasts red. *Kg*, resistant cartilage basement substance; *kn*, stratified bone; *kn*, depositing bone in profile showing probably an enveloped bone cell; *ks*, encapsulated cartilage cell; *ak*, osteoblasts in cartilage tissue.

PLATE II.—Fig. 4.—Perpendicular section through condyloid process stained with Delafield's hæmatoxylin-eosin.

*Kn*, opening of cartilage canal upon the ossification zone; *S*, bright cartilaginous zone on the border of ossification; *r*, unstained remainder of cartilage capsule; *k*, liberated cartilage cells with indistinct nuclei; *K*, remaining cartilage cells with capsule; *kg*, calcified cartilage basement substance; *kn*, first appearance of osteoblasts and bone with marrow tissue at *m*; *b*, blood-vessels and coagulated pericellular substance.

Fig. 5.—Another portion of the above section showing the mouths of the cartilage canals and death and resorption of the cartilage on the border of ossification; *kk*, cartilage nuclei; *kg*, unstainable portion of the calcified cartilage which distinctly shows the eroding process; *m*, marrow cells situated in an open cartilage cavity; *kz*, liberated cartilage cells; *l*, blood-vessel.

# Plate I.



Burk & Fiedler Lith. Photo.

Maxillary Ossification, (Schaffer)  
 Archiv für Mikroskopische Anatomie



## ANOMALIES.

## ANOMALIES IN THE FORMATION OF THE THORACIC CAVITY.

In the early stages of development the mesoderm divides into two layers, which, inclosing the yolk, form the body cavity or *cœlum*. The space thus formed by the division of the mesoblast is also called the pleuro-peritoneal cavity, because it later comes to inclose the lungs and abdominal viscera. They are at first one common cavity, but later become separated by the formation of the diaphragm, which arises as a dorsal extension of the pericardium. Congenital malformation of the diaphragm will necessarily result in the displacement or malposition of the contents of the pleuro-peritoneal cavities. These do not always give rise to any serious disturbance of the functions of the organs, as witnessed by the following case reported by John Smith<sup>36</sup> of the transposition of the thoracic and abdominal viscera in a married woman twenty-three years of age, her health not being sufficiently deranged to prevent her marrying and giving birth to a healthy child. Her trouble only seriously developed in the fifth month of her second gestation. Upon examination, the heart was found to be displaced and situated upon the right side (*dextrocardia congen.*). The liver was located upon the left side, the stomach was transposed, the greater part being on the right side of the middle line. The spleen was also displaced on the right side, its dullness being located between the eighth and tenth ribs in the right axillary region. All the viscera were located much higher than normal, probably more or less due to the state of pregnancy, which in this case operated to force them higher than usual.

Gruss<sup>17</sup> presented a case of *dextrocardia* in a man twenty-seven years old, where no history of antecedent pleurisy or pneumonia could be found, and which was in all probability congenital.

Poteïenko<sup>14</sup> describes an interesting case of *ectopia* of the heart in which that organ was absolutely devoid of pericardium, and was situated outside the thorax. The child lived only one hour.

A case of *ectocardia* operated upon successfully by Lannelongue<sup>55</sup> showed a defect about the size of a quarter-dollar. The gap was closed by a plastic operation.

A highly interesting and seldom found anomaly of *fissura*

thoracis lateralis is recorded by A. Pulawski, of Warsaw, <sup>13</sup><sub>May 15</sub> only one other being known.

Heinrich Hæckel <sup>20</sup><sub>Sept. 1</sub> publishes an account of an extensive congenital defect in the formation of the anterior wall of the thoracic cavity. The internal organs were normal, the anomaly being confined to the breast-wall.

*Anomalies of the Heart and Circulatory System.*—Robert Ziegenspeck, of Munich, <sup>86</sup><sub>Mar. 22, H. 1</sub> reports a case where the septum ventriculorum and the left ventricle were absent, also the ascending aorta. The child lived fifteen days. The autopsy revealed the fact that the ductus botalli and the aorta descendens were united. The aorta ascendens failed entirely. The other organs were normal.

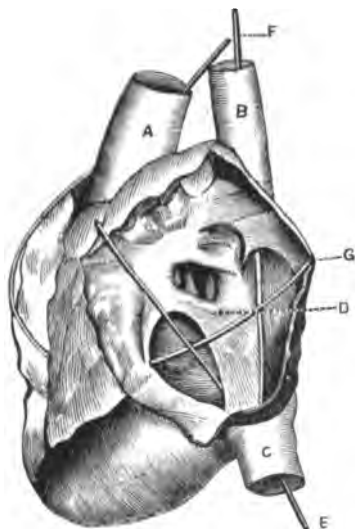


FIG. 5 (LIFE SIZE).—SHOWING ANTERIOR HALF OF AURICLE LAID OPEN.

A, aorta; B, vena cava superior, through which passes a probe into left half of auricle; C, vena cava inferior, through which passes probe (E) into right half of auricle; D, rudimentary septum, or persistent Eustachian valve; G, probe passing through auriculo-ventricular opening and out through aortic orifice.

(*New York Medical Record.*)

M. Howard Fussell, Manayunk, Philadelphia, <sup>9</sup><sub>Nov. 2</sub> describes a case of partial transposition of abdominal viscera and a heart with only three cavities. On autopsy the heart was found to occupy the anterior portion of the thorax. The auricles and right heart were greatly distended. The septum between the two ventricles was perforate, thus forming one cavity, the right being abortive in size.

W. P. Northrup, New York, <sup>59</sup><sub>Mar. 21</sub> presented a case of reptilian heart to the New York Pathological Society.

The specimen was taken from a child which lived two weeks. The heart was small and consisted of one auricle, into which emptied two veins—superior and inferior venæ cavæ—and one ventricle giving off the aorta. The pulmonary artery was represented by a fibrous string attached to the base of the heart.

P. Watson Williams <sup>131</sup><sub>Sept.</sub> notes a rare case of morbus cæruleus as occurring in a seven-year-old girl, who died in consequence of the malformation. There was no opening between the right ventricle and auricle, but an abnormal communication between the



ventricles. The auricles formed practically one cavity, the foramen ovale being large.

Eppinger<sup>113</sup><sub>Apr. 25</sub> presented to the Verein der Aerzte in Steiermark a case of congenital malformation of heart and large vessels. The aorta and arteria pulmonalis arose from the right side and the veins from the left side of the heart.

Richard MacDonnell,<sup>9</sup><sub>June 1</sub> describes a case of patent foramen ovale found in the dissecting-room of McGill University. The woman, aged twenty-five, had never shown any cardiac symptoms, although under observation for four years while being treated for phthisis. The opening was large and patulous.

Another similar case is recorded<sup>89</sup><sub>Feb.</sub> as being presented before the Philadelphia Obstetrical Society.

H. P. Loomis<sup>59</sup><sub>Oct. 4</sub> presented a specimen to the New York Pathological Society of a persistent foramen ovale discovered in a man aged fifty-three. The patient had always complained of shortness of breath and cyanosis. Lastly, a case was observed by me<sup>60</sup><sub>Feb. 25</sub> in a three-day-old child which had died from asphyxia.

*Aorta.*—John B. Deaver<sup>112</sup><sub>Oct.</sub> reports that in the last four years—1883 to 1888—he has only found four cases of malformation in the dissecting-rooms of the Medical Department of the University of Pennsylvania. In three of these anomalies the transverse portion of the arch gave origin to but two vessels—the innominate and left subclavian arteries; the right subclavian and right and left common carotids arose from the innominate. In the fourth the transverse portion of the aorta gave origin to three vessels—the right and left common carotid and the left subclavian artery, the right subclavian being a branch of the descending portion of the arch and passing behind the trachea. The only other case reported during the year is that of Ziegenspeck.<sup>95</sup><sub>Ed. 22, H. 1</sub>

*Pulmonary Artery.*—Two cases of malformation of this artery are recorded. A. W. Foot<sup>22</sup><sub>July 11</sub> describes a case of unusually large valves (two) in a pulmonary artery taken from a man aged sixty-nine, who had long suffered with aortic regurgitation.

William Collier, Oxford,<sup>1112</sup><sub>v. 9, p. 114</sub> reports a case of congenital malformation of the pulmonary artery which resulted in the death of the patient. The condition during life was diagnosed as an aortic aneurism.

*Veins of the Neck.*—J. G. Pinkham, Lynn, Mass.,<sup>99</sup><sub>Feb. 1</sub> records

an interesting case of knife-wound in the neck, whereby a young colored woman recently lost her life. Had the vessels been normal the stab would probably not have been fatal. The anomalous internal jugular had abandoned its position by the side of the internal carotid artery and turned outward, joining the external jugular to form one common jugular, which pursued its course downward, midway between that normally occupied by the two. This arrangement was alike on each side.

*Obturator Artery.*—Jno. B. Deaver<sup>112</sup> compiles twenty cases of anomalous position in this artery. In nine it occurred on both sides alike, while in nine others it was single on the left side, in one on the right, and in one other on both sides, but presenting differently on each side. In one of the nine cases where it was found on both sides alike, it arose by a common trunk with the deep epigastric from the external iliac and wound around the femoral ring. In three it arose from the posterior trunk of the internal iliac, in two from the deep epigastric and wound around the inner side of the femoral ring; in two from the deep epigastric and wound around the outer side of the femoral ring; in one from the internal iliac before it divides into its two trunks. In three of the cases where it was found on the left side alone it arose from the deep epigastric and wound around the inner side of the femoral ring. In two it had a similar origin but passed down on the outer side of the ring. In two it arose from the posterior trunk of the internal iliac. In still another, on the left side, it arose from the deep epigastric but wound around the outer side of the ring, while on the right it arose from the posterior trunk of the internal iliac. In the case occurring on the right side only, it arose from the deep epigastric and wound on the inner side of the ring. In but three instances was the artery found upon the inner side both alike.

*Umbilical Vein.*—Vincenzo Brigidi<sup>13</sup> reports a case of communication between the umbilical vein and the right iliac vein in a patient dead from cirrhosis. The vein passed outward along the course of the art. epigastrica inf., opening in the vena iliaca interna and passing above and to the outside of the umbilicus, ending in the portal vein in a manner identical to the foetal circulation.

*Portal Vein.*—Wm. S. Bryant<sup>1</sup> reports the discovery of valves in the portal veins in the majority of infants examined.

*Ductus Arantii*.—R. Paltauf,<sup>8</sup><sub>v.1, No.7</sub> reports a case of ascites in a foetus as the result of the absence or obliteration of the ductus venosum.

## ANOMALIES OF THE ALIMENTARY TRACT.

Malformations in the abdominal viscera are generally the result of congenital arrest in development. Last year we had several cases of displacement of the colon and abdominal viscera. This year we have none such to record.

*Cæso-phagus*.—Apitz,<sup>352</sup><sub>Mar.1</sub> records a case of imperforate cæso-phagus, ending in a *blind cul-de-sac*. The intestines were filled with meconium, which gives rather substantial evidence to the support of those who hold that the amniotic fluid has nothing to do with the nourishment of the foetus.

Lyot,<sup>7</sup><sub>Jan.</sub> reports a case of congenital stenosis and misplacement of the descending and a portion of the transverse colon. The anus was normal, as was also the ilium, jejunum, and ascending colon, as opposed to the above.

Walther,<sup>7</sup><sub>Mar.</sub> reports a case of dilatation of the colon just above the sigmoid flexure, so that the large intestine almost filled the abdominal cavity.

Maas, of Wurzburg,<sup>317</sup><sub>Apr.22</sub> reported a case of gigantic intestinal diverticulum in a boy aged fourteen. The abdomen began to swell soon after birth and continued till death, which followed an operation for relief of the condition. It was found at the autopsy that a large diverticulum connected with the rectum, which Kölliker and Maas pronounced as probably congenital in origin.

Vanheeuverswyn, of Lille,<sup>220</sup><sub>Jan.18</sub> presents a case of intestinal diverticulum occurring in a man aged thirty-five, who died of pneumonia. The diverticulum was six centimetres long and originated one metre forty centimetres from the beginning of the cæcum. It was situated in the region of the umbilicus, and was probably a persistent diverticulum of Meckel or the urachus.

*Ductus Communis Choledochus*.—Jno. Blake White,<sup>27</sup><sub>Jan.</sub> reports a case of icterus infantum congenita from impermeability of the above duct.

*Imperforate Anus*.—Valat,<sup>7</sup><sub>May</sub> describes an interesting case of the above malformation combined with atrophy of the sacrum and absence of the coccyx. Instead of an orifice a tumor was found upon examination. The genital organs were normal. Operation

was resorted to, but it was impossible to reach the inferior extremity of the rectum. On section, the ureters, bladder, and vesiculæ seminales were found to be normal, but the rectum ended in a blind *cul-de-sac* two centimetres from the perineum.

W. T. Hartshorn<sup>6</sup><sub>Apr. 21</sub> reports the case of a female child with imperforate anus, the fæces passing per vagina, upon which he operated successfully

De la Barrière<sup>100</sup><sub>Feb. 11</sub> reports a case where the rectum opened in the folds of the vulva. An artificial orifice was successfully made in the natural position.

Hingston<sup>221</sup><sub>Sept.</sub> reports a similar case of imperforate anus with passage of fæces per vagina, the operation being also successful.

H. Earnest Goodman<sup>60</sup><sub>Feb. 25</sub> reported a case of considerable interest. Colotomy was performed without success for imperforate anus and atresia of the rectum, in a newly-born male child. The autopsy was made by me, when it was found that the rectum ended in a funnel-shaped sac which emptied into the urethra at the base of the caput gallinaginis through a punctiform orifice.

Frederick Page<sup>2</sup><sub>Oct. 30</sub> gives an interesting account of a man, aged fifty-four, who had passed his fæces per urethra all his life. An attempt had been made soon after birth to establish an anus at the natural situation, but with only partial success. The fæces still continued to pass through the urethra, though fluid had from time to time been known to pass through the anus. At the age of ten the urethra became clogged with hardened fæces, and an incision was made just in front of the scrotum into the urethra and the fæces removed. The fistula thus formed was left and furnished some relief. The passage again stopping, caused him to seek relief in a second operation. By enlarging the fistula and stitching the mucous membrane to the skin a considerably enlarged opening was formed, with which the patient seems well pleased. He was married at twenty-four, and is the father of one child. He has lost, to a considerable extent, his dark, swarthy complexion since the last operation, his bowels move regularly without medicine, and he says that he is more comfortable now than at any previous period of his life,

M. S. Crow<sup>85</sup><sub>May</sub> reports a case of imperforate anus upon which he operated at the site of the anus for relief. He failed entirely,

the rectum being absent and the colon ending in a blind pouch above the brim of the pelvis.

Peters<sup>113</sup><sub>May</sub> records a case of atresia recto-urethralis, in which perineal incision was unsuccessful.

Hildebrandt<sup>301</sup><sub>v. H., p. 371</sub> performed enterostomy in the regio iliaca sinistra for imperforate anus and diverticulum of the rectum, with successful result.

Surgeon-Major K. P. Gupta<sup>6</sup><sub>Apr. 21</sub> reports a case of congenital atresia of the normal anus and the formation of an artificial opening at the level of the third lumbar vertebra just above the left nates and about two inches below the last false rib. The child suffered no inconvenience thereafter in defecation.

D. Berry, of Ashley, Ill.,<sup>199</sup><sub>Nov.</sub> reports a case of atresia of the rectum with imperforate anus which was not operated upon, the child dying at the end of the seventh day.

A. Broca<sup>7</sup><sub>Dec. 27</sub> describes an interesting case of entire absence of the rectum and anus in which the colon ended in a pouch that was adherent to the posterior wall of the bladder.

#### ANOMALIES OF THE GENITO-URINARY SYSTEM.

*Atresia of the Glans Penis, with Hypospadias.*—T. G. Stephens, of Sidney, Iowa,<sup>176</sup><sub>Nov.</sub> records a case of hypospadias observed in a young man twenty-four years of age. The orifice was situated about one-sixteenth of an inch posterior to the frenulum. There was complete atresia of the glans.

*Double Urethra.*—This anomaly is of especial interest in that it is of very rare occurrence. Only three or four have been recorded.

J. Englisch<sup>336</sup><sub>Oct. 20</sub> describes a well-authenticated case. The upper canal was twelve centimetres long and ended in a blind sac at the anterior portion of the pelvis. It lay in the depression between the two lateral sides of the corpora cavernosa, which separated it from the normal urethra.

*Imperforate Urethra.*—S. G. Shattock<sup>6</sup><sub>Feb. 11</sub> showed a specimen before the London Pathological Society of distended bladder in a four-month-old child, due to complete atresia of the orifice and atresia of the urethra. The kidneys were cystic.

*Extrophy of the Bladder.*—Broca<sup>7</sup><sub>Jan.</sub> presents a very interesting case in a classical paper on the subject. (See Fig. 6, next page.)

Besides the extrophia vesicæ, there was malformation of the intestines, congenital absence of the anus and rectum, the colon ending in a *cul-de-sac* which was attached to the posterior portion of the bladder. It was also a case of spina bifida.

Archibald Johnston<sup>213</sup><sub>July</sub> showed a case of extroversion of the bladder in a male child, four and one-half months old, before the

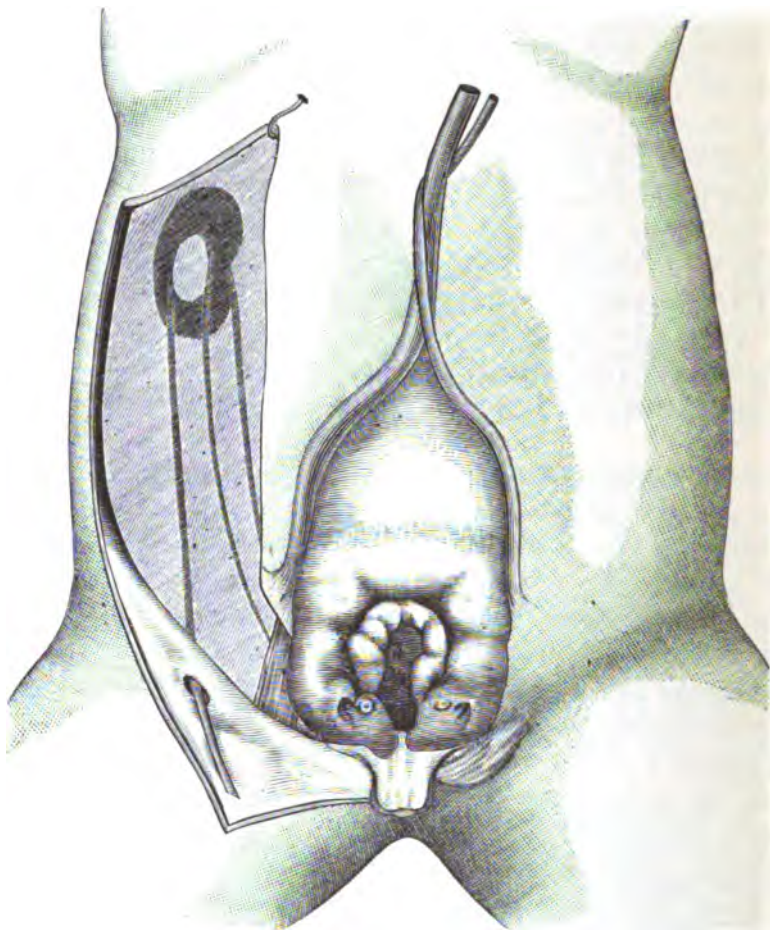


FIG. 6.—(*Bulletin de la Société Anatomique.*)

Glasgow Southern Medical Society. The openings of both ureters were visible, the glans penis was cleft, and the symphysis pubis absent. The case was further complicated by a compound hernia.

*Anomalies of the Kidneys.*—Carrieu<sup>7</sup><sub>Dec. 97</sub> presented a very unique case to the Paris Society of Anatomy. The two kidneys were united and lay in the median line. The two ureters were

separated, one being very much distended. The organ had six well-marked depressions or sulci that could be compared to the calices. The vascular supply was much disarranged and very complex.

*Absence of Kidney.*—In an autopsy made by me, <sup>60</sup><sub>Feb. 28</sub> on a child three days old, which died from the effects of an imperforate anus, the left kidney was missing, the ureter was perforate for two and one-half inches from its union with the bladder, but ended in a blind *cul-de-sac*. The bladder was diverted to the right side. The other kidney was normal.

*Abnormality of the Kidney.*—A. M. Paterson, <sup>2</sup><sub>Mar. 31</sub> showed to the Manchester Pathological Society a preparation in which the right kidney was displaced, lying in the angle between the common iliac vessels on the fourth and fifth lumbar vertebræ, and projecting downward over the promontory of the sacrum. The hilum was placed anteriorly, and from it the ureter passed downward, and a large vein upward to the inferior vena cava. The left kidney was normal in position. Its hilum was placed in front, also the pelvis. The ureter, lying on the anterior surface of the organ, was extremely large. The arteries to both kidneys were abnormal in number and mode of origin. The right kidney was supplied by four and the left kidney by five vessels. The testicles and their vessels and the suprarenal capsules were normal.

E. W. Morgan, of Chicago, <sup>59</sup><sub>July</sub>, describes the following anomalous locations of the right kidney: The subject, a female of about twenty-five years, was a college cadaver, of which he could find no life-history. The left kidney was normal in every respect. The right kidney was also normal as regards shape and structure, but lay, slightly curved, upon the left sacro-iliac synchondrosis, the hilus being directed to the vertebral line. The renal arteries were two in number, one arising from the abdominal aorta, one-half inch above its terminal division, the other from the uppermost portion of the right common iliac. The ureter accompanied its fellow to the bladder, where it turned aside to reach and open into that viscus at its usual location.

A specimen was shown to the St. Louis Medical Society, <sup>82</sup><sub>June 22</sub> of a kidney in which there was a double pelvis and a double ureter. The two ureters united and entered the bladder as one.

A. Davidson, <sup>187</sup><sub>Jan.</sub> showed to the Liverpool Medical Institute an interesting specimen, which was obtained from the body of a very

small woman, aged fifty-five, who suffered from chronic bronchitis and emphysema, with extreme induration of the liver. The kidneys were congested, but not otherwise diseased, and each of them had a double ureter, which united into a single one before entering the bladder. On the right side the union occurred quite close to the bladder, but on the left about four inches above this viscus.

#### ANOMALIES OF THE EXTERNAL GENITO-URINARY ORGANS.

Under the above heading will be classed the various forms of epispadia, hypospadia, phimosis—congenital and acquired, malformations of the testicles, hermaphroditisms and malformations of the clitoris and hymen. The direct connection between malformations of the genital organs and idiocy and epileptoid conditions has been well presented during the past year by Bourneville and Sollier,<sup>73</sup> in a classical essay on the subject, based upon personal observations in upward of seven hundred cases. According to their tabulated statements, it has been found that in two hundred and twenty-three cases examined under thirteen years of age, one hundred and sixty-four were idiots, while fifty-nine were idiotic and epileptic also. In five hundred and five cases over thirteen years of age, one hundred and seventy-two were idiotic; one hundred and thirty without being epileptic, and three hundred and thirty-three were afflicted with epilepsy also. In those under thirteen years of age, the marked influence of a weak mental condition on the developing genital organs was well shown, for out of one hundred and sixty-four idiotic, imbecile, or epileptic males ninety-one presented anomalous formations, forty-eight had ectopia of the testicles on both sides, and in thirty-nine no testicles could be discovered. There was in these cases an evident arrest in development dependent upon the weakened condition of the mental forces. These cases were resultant, in most instances, from hereditary taints or conditions existing previous to the full development of the genitalia; on the other hand, in the five hundred and five cases examined where the patient was over thirteen years of age, the idiotic and epileptoid condition was acquired after the genital organs were more or less completely developed and the marked influence of the genital organs upon the mental condition is well shown; for out of one hundred and seventy-two idiotic, imbecile, or weak-minded children, fifty-five presented anomalies consisting of—



phimoses, nineteen; hypospadias, six; single atrophy of the testicles, ten; double atrophy, seven; ectopy of testicles, fifteen, with four cases of "bell-clapper" glans and two varicoceles. Out of the three hundred and thirty-three idiotic and imbecile, twenty-seven were cases of phimosis; six of hypospadias; twenty-four, varicoceles; twenty-two cases of atrophy of testicles; five double ectopias; two varices, and two cases of "club-shaped" glans. The latter malformation was often met with in idiotic patients alone, and the writers do not attribute it to masturbation, as many of the cases were known not to be addicted to that vice. These deductions are fully in accord with my own observations.

*Congenital Absence of Penis.*—Vinogradoff, of Bolshïë,<sup>26</sup> records a case of a peasant boy of seven who was without any penis, although the scrotum and testicles were normal.

Joseph Jones, New Orleans,<sup>61</sup> presented the history of a case to the American Medical Association in which there was only a rudimentary organ three-fourths of an inch long. The scrotum and testicles were entirely absent; no indication of a vagina or uterus was found. This was probably a case of cryptorchidismus, with congenital malformation or arrest in development in the penis.

*Anomalies of Testicles (Cryptorchidismus).*—A. M. Pickett<sup>199</sup> records a case of a man who had had only one testicle from birth.

Woodward, at an ordinary meeting of the Anatomical Society of Great Britain and Ireland,<sup>6</sup> showed an adult rabbit, in which the testicle was undescended and protruding into the peritoneal sac below the kidney. The gubernaculum was properly developed, and there was no obvious cause for the non-descent, except that the gland itself was small. Lockwood showed specimens illustrative of the last. They included: 1. A human anencephalic fœtus, whose scrotum was ill-developed, like that of a cryptorchid, and in which the left gubernaculum was not attached to the testicle or epididymis. 2. A specimen of undescended testis from a youth of eighteen. The left gland lay in the iliac fossa, whilst the processus vaginalis was four inches long and protruded from the external ring. The vas deferens had accompanied the processus, and to the extremity of the loop which it formed a strong band of gubernaculum fibres were attached; the ascending cremaster

was also well developed. 3. Another specimen was shown to demonstrate the recurrent branches of the spermatic artery.

Sibley showed an undescended testis from a bonnet monkey. The misplaced organ was small, and only weighed five grains, but its fellow weighed seventeen grains, and was very distinctly hypertrophied.

*Misplaced Testicles.*—W. Popow, St. Petersburg,<sup>7</sup> presented a case where the left testicle was situated in the iliac fossa.

D. Berry,<sup>199</sup> presented a case where the scrotum occupied the position of the mons veneris and labia majora, but contained only one testicle.

P. Loreta,<sup>396</sup> records a case where the right testicle was discovered in the right hypogastrium.

*Supernumerary Testicles.*—G. C. Lewis<sup>115</sup> tells of an interesting case that came under his care of a man with three testicles.

*Hypospadias.*—Christopher<sup>53</sup> presented to the Cincinnati Academy of Medicine a thirteen-month-old child with a rudimentary penis, which was bound down to the scrotum in the median line. The testicles were absent, although the parents affirmed that they were down at birth but had receded. The urethral orifice was punctiform and situated one-fourth inch posterior to the glans. Urine was passed freely without straining.

H. H. A. Beach<sup>99</sup> describes a case occurring in the practice of Dr. Hastings, of Warren, of failure of the penial urethra. The urine was passed through two narrow fistulæ in the perinæum. Fæcal matter was also passed by a similar opening, there being no trace of a sphincter muscle.

*Human Clouca.*—Bonnain<sup>17</sup> reports a case of entire absence of vagina, perinæum, and anus. Urine and fæces were emptied into a common cavity. What is known as the inferior strait was not present. The woman was delivered of a large, healthy child.

Chambrelen<sup>188</sup> presented a similar case to the Bordeaux Society of Anatomy.

*Hermaphroditismus.*—Twelve cases of this illy defined malformation have been recorded during the year; one by Fancourt Barnes;<sup>49</sup> a second by Aveling,<sup>49</sup> in which an enlarged clitoris was removed on account of the great discomfort caused by friction when coming in contact with clothing.

C. Stoneham,<sup>2</sup> reports a case of vertical hermaphroditism

where the autopsy revealed the correctness of the diagnosis. The external organs were those of a male with undescended testicles; there was a partial hypospadias; the bladder was normal, its neck surrounded by a prostate; the uterus was well formed and opened into the vagina; testes were attached to the cornua of the uterus; immediately beneath the testes were found the epididymis and Fallopian tubes. Several members of the family had malformed genital organs.

Lükomsky <sup>571</sup><sub>Nov. '87; Jan. 14</sub>, <sup>2</sup> describes a case of true hermaphroditism. Patient aged thirty. Penis four and a half centimetres long, without urethra, capable of complete erection under sexual excitement; below the penis is located a well developed scrotum containing two testicles; below the scrotum was found a normally developed vulva with labia majora and minora, inclosing a clitoris, beneath which was discovered the urethral opening. The vagina measured seven centimetres and was fairly capacious; further investigation revealed a uterus with normal cervix. The patient had never menstruated. When coition was had with a female, of which "it" was capable, a whitish fluid was ejaculated through the vaginal slit.

Boudareff, of Kïev, <sup>586</sup><sub>No. 51, '87; Mar. 1</sub>, <sup>2</sup> describes an interesting case of pseudo-hermaphroditismus. The patient was thirty-five years of age, single. The genital slit measured three centimetres. The labia majora contained oval bodies the size of ordinary testes, from which the spermatic cords could be traced into the pelvic cavity. The labia minora were imperfectly developed and seemed more like continuations of the prepuce of the clitoris. The latter measured six centimetres in length and four and a half in circumference. It contained no urethra. The urethral orifice was situated at the upper angle of the vaginal opening and was patulous, easily admitting two fingers. The vagina was shallow, three centimetres, and it is supposed that sexual intercourse was had per urethra. The vagina ended in a rudimentary uterus. The patient had never menstruated, but had regular sexual intercourse.

D. Berry <sup>199</sup><sub>Sept. 8</sub> reports a case in an infant. The penis was rudimentary, one-fourth inch in length, comparing to the clitoris. The scrotum was situated above and contained one testicle only.

D. Obolonsky, <sup>817</sup><sub>Sept. 8</sub> Charkow, records a case of hermaphroditismus verus lateralis with development of a testicle on the right side and an ovary on the left side. The patient was twelve years

old and had passed for a girl. The outer genitals were feminine; clitoris normal, two and one-half centimetres long. The canalis urogenitalis was normal; the urethra was four and one-half centimetres long and revealed a colliculus seminalis and prostata in the regular position. The vagina, six and one-half centimetres long, ended in an eight-centimetre uterus.

G. Schmorl, of Leipsig, <sup>20</sup><sub>Aug. 3</sub> minutely describes a case that was under examination for some time. The patient had a rudimentary penis five centimetres long, no scrotum, labia majora situated on either side. The left side located an oblong body, attached to the upper part of which a distinct cord could be observed. The opening of the urethra was about one-half centimetre from the base of the penis. At the point where the colliculus seminalis is normally located were found three narrow openings. Into the largest of these was passed a sound, which entered fifteen centimetres and came to a body which proved to be a rudimentary uterus.

#### ANOMALIES OF THE VAGINA, HYMEN, AND UTERUS.

Two cases of total absence of the vagina have been reported during the year.

J. S. and A. S. McMurry, of Frankfort, Ind., <sup>27</sup><sub>Mar.</sub> publish an interesting case of imperforate vagina that was not discovered until the patient had reached the age of sixteen years. A shallow *cul-de-sac*, the orifice of which was surrounded by the carunculæ myrtiformes, was all that was to be seen upon examination. Operation for artificial vagina to relieve serious disturbances due to retention of menstrual fluid was entirely successful.

J. Balin <sup>41</sup><sub>Nov. 26</sub> records a case of congenital absence of vagina, uterus, and its appendages. The woman, aged twenty-two, had had sexual intercourse, but per urethra, which was considerably dilated.

P. H. Griffin <sup>9</sup><sub>Aug. 25</sub> reports a case of unusual interest in which there was total absence of the vagina and the outlet for the menstrual fluid. What there was, was by the urethra, which was anomalous in character, but whether congenital or not was not decided by the writer. The orifice of the urethra was punctiform and micturition was performed with difficulty. Operation for artificial vagina was first performed, the diagnosis of the urethral outlet to the uterus not having been made till subse-

quently. Final operation, that of dilation of the urethra, was entirely successful.

Three cases<sup>383</sup><sub>v.16</sub> of atresia of the vagina are recorded as having been discovered in A. Martin's clinic, Berlin.

*Vaginal Septa.*—P. Ménière<sup>154</sup><sub>June 15</sub> reports one case of double vagina with single uterus upon which he operated successfully with the aid of the galvano-cautery.

H. Moulton, of Stuart, Iowa,<sup>61</sup><sub>May 26</sub> records a very interesting case of vertical septum of the vagina, as above; this was incised and labor was normally completed.

A correspondent records<sup>27</sup><sub>Nov.</sub> three cases of double vagina as being discovered in A. Martin's private hospital in Berlin, one of which was complicated hematouretra and hematocolpus of the right side, from which eighteen hundred grammes of a dark-red, tarry menstrual fluid were evacuated when the hymen was incised.

*Anomalies of Hymen.*—S. Krysinsky, of Dorph,<sup>28</sup><sub>Sept.</sub> reports a rare case of anomaly of the hymen. There was a peculiar valvular arrangement which inclosed a blind pouch. No urethral opening could be found anterior to the hymen. The urine was passed through a small opening to the left side of the vulva, which would barely admit a five-millimetre sound. It was judged that the opening of the urethra was from two to three centimetres behind the hymen in the vagina.

V. Mibelli<sup>28</sup><sub>Nov. 16</sub> records a case where the hymen had two side-openings; the membrane was otherwise intact.

A case of imperforate hymen is reported by Zinsstag.<sup>317</sup><sub>No. 14; Aug.</sub> The urethra was dilated by coitus, the woman having become pregnant, and although no opening was found upon examination previous to labor, yet one must have existed, because no special trouble had been complained of regarding menstruation.

*Cysts in the Hymen of the Newborn.*—Ziegenspeck<sup>95</sup><sub>Vol. 37; July</sub> records two such cases. Winckel has recorded two cases, and Döderlein one previous to the above.

*Congenital Absence of Uterus.*—Uspensky<sup>317</sup><sub>June</sub> reports a case of entire failure of the uterus in a woman thirty years old, with normal vagina.

Brunes<sup>360</sup><sub>Mar.; June 2</sub> describes two cases of defective uterus and vagina. The first case was in a patient nineteen years old, who had com-

plained of molimen menstruale since her fifteenth year. The outer genitals were normally developed. The other patient was twenty-one years old, and no trace of vagina or uterus could be found upon thorough rectal examination.

Ivan S. Balin<sup>586 108</sup><sub>Nov. 22; Nov.</sub> records an interesting case of a patient, aged twenty-two, who had never menstruated, was married, and had had intercourse per urethra, as there was no trace of vagina or uterus, although the external genitals were normally developed.

J. Klein<sup>168</sup><sub>May 1</sub> describes a case of a woman, aged twenty-seven, who had been perfectly well up to twenty-one years, but who at the time of examination suffered from vicarious epistaxis. The ovaries were normal, but the uterus and vagina were absent.

Oliver<sup>2</sup><sub>Nov. 24</sub> presented a case of congenital absence of the uterus, ovaries, and vagina in a patient aged twenty-one. The breasts were poorly developed. The patient complained of pain in the lumbar region. The urethra was dilated and the orifice granular.

Steinschneider<sup>317</sup><sub>Jan. 20</sub> reports a case where the uterus was wanting, with vagina normal. The external genitals were normal. Patient had never menstruated. The ovaries were also probably absent.

L. H. Dunning, of South Bend, Indiana,<sup>2</sup><sub>May 19</sub> read an exhaustive paper on "Double Uterus and Vagina" before the American Medical Association. After reporting an interesting case he gave an analysis of ninety-seven cases whose histories he had collected. In the ninety-seven there were:—

Uterus bipartitus, . . . . .	7 cases.
" unicornis, . . . . .	3 "
" bicornis, . . . . .	52 "
" bilocularis, . . . . .	23 "
" single, neck and vagina double, . . . . .	2 "
Not clearly stated, . . . . .	10 "
Atresia of vagina, . . . . .	6 "

Of the ninety-seven, forty-seven were married, three unmarried bore children, making fifty mothers.

Number of women pregnant, . . . . .	42
" " pregnancies, . . . . .	76
" " natural labors, . . . . .	42
" " difficult labors, . . . . .	18

Means of relief in these:—

Forceps, . . . . .	7
Turning, . . . . .	1
Septum cut, . . . . .	4
Rupture of uterus, . . . . .	1

Of the forty-two pregnant women fourteen miscarried eighteen times. Twenty-three and six-hundredths per cent. of pregnancies resulted in abortion or miscarriage. No instance of a pregnant uterus bipartitus is found in the ninety-seven.

There were pregnancies in:—

Uterus unicornis, . . . . .	3
“ bicornis, . . . . .	21
“ bilocularis, . . . . .	12
Single uterus, with double vagina, . . . . .	4
Unknown form, . . . . .	2

He concludes that the malformation is more common than generally supposed.

*Uterus Bicornis*.—Martin<sup>383</sup><sub>Bd.15,H.1</sub> discovered three cases in his private clinic during the year. In one instance conception took place in one horn, which led to a diagnosis of extrauterine pregnancy. The separation of the ovum following curetting of the uterus proved the error in diagnosis.

*Uterus Bicornis, Semi-duplex or Unicollis*.—Donald<sup>2</sup><sub>Nov.21</sub> exhibited a double uterus obtained from an unmarried girl, aged seventeen years, before the Manchester Pathological Society. The cervix was single, but the uterus was divided by a septum which extended to the level of the *os internum*. A sound had been passed during life and a diagnosis of myoma had been made for the unexplored horn.

*Double Uterus and Vagina*.—Debierre<sup>7</sup><sub>Nov.11</sub> describes a very interesting case of the above in a paper upon the origin of such malformations. The case also presented double ureters on either side.

Karl Huber<sup>20</sup><sub>Bd.3,H.1</sub> reports a case of the above malformation which was not discovered until the patient was sixty-five years old, when she came to the clinic suffering from what afterward proved to be carcinoma.

Millice Culpin<sup>2</sup><sub>May 6</sub> records a case of conception and birth in a woman who had a double vagina and uterus.

Eugene Tauffer<sup>317</sup><sub>No.15</sub> reports a case of uterus didelphys in a multipara, which was discovered through a fever that arose from the retention of the membranes in one horn of the uterus after birth. He holds that both uteri were pregnant, and that one was delivered normally while the placenta was left in the second.

A case of double uterus and vagina is described by J. B. Hawes,<sup>59</sup><sub>July 28</sub> in which one of the vaginæ only had an outlet. One

uterus was filled with pus, as also was the blind vagina. Operation resulted in recovery.

A case is reported<sup>23</sup><sub>Nov.</sub> of double vagina and uterus. A successful operation was performed upon the vaginal septum.

*Double Vulva, Vagina, and Uterus.*—J. Bechtinger, Para, Brazil,<sup>23</sup><sub>July</sub> reports a case of a female monster that came under his notice. The two vulvæ were situated between two fairly well-developed legs and were separated by a third leg. Sensation in both vaginæ was normal and sexual connection was also possible in both (see Fig. 7).

Lewis Whaley, of Blountville, Ala.,<sup>207</sup><sub>Sept.</sub> describes the case of



FIG. 7.—TWO COMPLETE AND SEPARATE VULVÆ AND VAGINÆ, FOUR MAMMÆ, THREE LEGS.  
(*Annals of Gynecology.*)

Mrs. B., to whom he was called, which is very similar to the foregoing case, but in this instance the patient had four legs and two uteri as well as two vaginæ. The woman was found to be pregnant and an induced labor was brought on which proved the gestation to be of three and a half months' standing. These two cases will be again referred to under the head of Monstrosities.

#### ANOMALIES OF THE EXTREMITIES.

*Onychogryphosis Congenita.*—Mathew Johnston<sup>6</sup><sub>Apr. 14</sub> describes



a marked case of the above deformity occurring in a girl, aged eleven years. The hands and feet were normally developed, with the exception of the nails.

*Syndactylism*.—Edmund Owen,<sup>22</sup><sub>July 1</sub> reports a case in a boy of sixteen months where the middle and ring fingers of each hand were united their whole length. Norton's operation was successfully performed.

Seguy and Levy, Algeria,<sup>19</sup><sub>Mar. 26</sub> report an interesting case of the above complicating polydactylism in the same individual.

Jul. Dollinger<sup>113</sup><sub>Feb. 4</sub> operated successfully upon a case of syndactylism on the hand of a child.

*Polydactylism*.—Frank H. Hopkins,<sup>59</sup><sub>July 21</sub> presented some sections of a supernumerary finger to the New York Pathological Society. The finger was attached by a fibrous band which allowed free movement of the extra digit.

Duncan<sup>89</sup><sub>June</sub> described a small growth removed by himself from the first phalanx of the fourth finger of an infant, which he considered as in the nature of a supernumerary digit.

Black,<sup>2</sup><sub>June 30</sub> presents a case of supernumerary thumb on both hands. Alexandre, of Paris,<sup>73</sup><sub>May 15</sub> records a somewhat similar case with persistent flexure of the first phalanx of the third finger.

Seguy and Levy<sup>19</sup><sub>May 26</sub> presented a case before the French Society for the Advancement of Science of supernumerary third and little fingers. The ring fingers were united by a membrane.

Foucard<sup>152</sup><sub>June 26</sub> records a case of supplementary fingers, six on each hand.

*Acromegalia*.—Oscar Fränkel<sup>69</sup><sub>Aug. 9</sub> presented a case where there was marked enlargement of the hands and feet, due to hypertrophy, not only of the soft tissues but the bones also.

Adler<sup>61</sup><sub>Nov. 10</sub> records the first case known in America. The patient was, however, of foreign birth, and first noticed the beginning of the deformity when twenty years of age. There was more or less general hypertrophy of the bones and soft tissues. The case is very interesting.

W. Erb, of Heidelberg,<sup>41</sup><sub>Oct. 22</sub> describes a case in a patient aged fifty-eight, making the twelfth case recorded in German literature. There was marked hyperplasia of the soft tissues.

*Absence of Fingers*.—G. C. Wilken,<sup>6</sup><sub>Dec. 24, 77</sub> records a case in a Chinaman where both thumbs were absent. There was also an

arrest in the development of the bones of the hands, also in the muscular tissues.

J. H. Burns, of Toronto, <sup>39</sup><sub>Apr.</sub> describes a case of hereditary defect in the second phalanges in the second, third, fourth, and fifth fingers and toes, and of the first phalanges in the thumbs and great toes of both hands and feet, which deformity had run through five generations.

*Fusion of the Fingers.*—Percy Potter <sup>6</sup><sub>Apr.</sub> showed a man before the West London Medico-Chirurgical Society in whom the metacarpal bones were so united as to give the hand the appearance of possessing but two digits and a thumb.

*Absence of Extremities.*—J. H. Stowell <sup>115</sup><sub>Aug.</sub> describes a case of an infant which only lived a few hours. Its lower limbs were absent; one arm was missing from the elbow, while the other arm was full length. The hand possessed only three fingers, two of which were united.

J. N. Mendenhall <sup>143</sup><sub>Mar.</sub> delivered a woman of a healthy child in which the left hand was absent. The left forearm ended two inches from the elbow-joint in a stump which bore two rudimentary fingers.

Charles H. Bedford <sup>2</sup><sub>Apr. 22</sub> reports a case where the radial and ulnar inferior extremities of the right hand were pointed, and no articular surface was to be felt. The thumb was entirely wanting. The left hand was normally developed.

*Deformity of Lower Limbs.*—James K. Young, of Philadelphia, <sup>5</sup><sub>Feb.</sub> describes a case of a rare deformity occurring in a child. The tibia was partially absent on one side and wholly so on the other. One foot had only four toes.

Bidder, of Berlin, <sup>69</sup><sub>May 10</sub> records a case of malformation of the tibio-tarsal articulation. There was a marked rudimentary development of the fibulæ with pronation of the feet from the tibio-tarsal joint. This malformation has acquired the name of Volkman's tibio-tarsal deformity.

B. T. Mouser, of Oakland, Cal., <sup>186</sup><sub>Mar.</sub> reports a case of absence of the patella in an infant. Adhesive-plaster bands were applied and the condition was markedly improved.

*Intrauterine Amputations.*—J. B. Sullivan <sup>121</sup><sub>Jan.</sub> reports a case of intrauterine amputation of the left leg and malformation of the genital organs.

Several other cases have been recorded during the past year, in which there appears to be some doubt as to whether they were cases of arrest of development or intrauterine amputations.

F. L. Sim, of Memphis, Tenn.,<sup>74</sup><sub>Oct.</sub> records two cases—one where the left foot and ankle were removed just above the malleoli and the stump perfectly healed, the tendons being attached in the firm cicatricial tissues; the other was a supposed amputation of the forearm two inches below the elbow-joint. Attached to the stump were five rudimentary fingers.

Still another case is reported by J. G. Blake,<sup>80</sup><sub>Nov. 22</sub> both arms being missing, or partially so. The left arm presented the appearance of a stunted member, being only a few inches in length and possessed of two fingers which grasped quite firmly.

#### MONSTROSITIES.

*Anencephalia*.—Nine cases of this most common of all deformities have been recorded during the year. W. T. Greene,<sup>22</sup><sub>Mar. 7</sub> reports a case of a supposed six-months foetus, in which there was an entire absence of the occipital and parietal bones. F. G. Lutz,<sup>82</sup><sub>May 22</sub> describes a similar case which was complicated with spina bifida. Hurburt,<sup>83</sup><sub>Jan.</sub> also reports a like case in which there was an attempt at the formation of the parietal and temporal bones. Garnett Wilson,<sup>86</sup><sub>Mar.</sub> describes a case occurring in one of twins. This is of rare occurrence. W. N. Heygate,<sup>6</sup><sub>July 14</sub> reports a case complicated with hydramnios. R. L. Randolph,<sup>12</sup><sub>Sept.</sub> and William Hardwicke,<sup>6</sup><sub>Nov. 17</sub> describe undoubted cases. J. F. Lockwood,<sup>59</sup><sub>Aug. 10</sub> reports a case in which the hemispheres of the brain were observable, but without covering.

*Acephalia*.—Gurd,<sup>130</sup><sub>Mar.</sub> describes a case where the head was represented by a membranous sac filled with fluid.

*Spina Bifida*.—J. F. Lockwood,<sup>59</sup><sub>Aug. 10</sub> records a case where the outer coverings to the spinal cord were absent.

W. H. Bargtold,<sup>259</sup><sub>Sept.</sub> describes an interesting case of the above malformation.

Broca,<sup>7</sup><sub>Dec. 27</sub> refers to a spina bifida as complicating a marked case of extrophia vesica, and which was located in the lumbar region.

*Cyclopia*.—Valude,<sup>7</sup><sub>Dec. 27</sub> treats quite fully of the subject. No new cases, however, are recorded during the year, unless the table

compiled by Hannover<sup>16</sup> may be so considered. He says that to be able to judge of the frequency of the occurrence of cyclopia in man he has prepared the following table, framed partly from the results to be found in the writings of others, and partly from his own observations in the museum of Copenhagen and other places. A comparison of the number of cases occurring in man with those occurring in other animals has no real interest; for, in all probability, abnormal specimens of the human foetus have been preserved and described oftener than in cases of any other animal. But a comparison between the animals themselves presents more interest:—

**NUMBER OF FŒTUSES AFFECTED WITH CYCLOPIA.**

[illegible]

*Anophthalmus*.—Menacho<sup>6, 22</sup> describes a case where the eyelids, lachrymal glands, and orbits appeared to be well formed. The cavity was invested by the conjunctiva, but no eyeballs were to be discovered, even in rudimentary form.

James K. Young,<sup>9</sup> reports a case of unilateral anophthalmus in a patient aged fifty-two years. There was a small fibrous mass at the bottom of the orbit.

*Tumors of the Brain, Meningocele.*—H. T. Batchelor<sup>2 Oct. 27</sup> reports the case of a child born with the above pathological condition. The tumor continued to increase in size after birth.

*Hydrocephalus*.—A correspondent<sup>199</sup><sub>Sept.</sub> describes a case in an eight-months child, cured by gelsemium and potassium bromide, *ter in die*, administered during three months. B. R. Leroy<sup>186</sup><sub>May</sub> records a case where three children in succession were similarly afflicted. Craniotomy had to be performed. W. D. Bidwell<sup>121</sup><sub>Dec. '9</sub> describes a case at length. L. L. Taylor<sup>19</sup><sub>May '9</sub> reports two cases occurring in his practice during the past four years, in which time he has attended four hundred and ninety-six labor cases at full term. Mosler<sup>69</sup><sub>Aug. '9</sub> presents a case of congenital hydrocephalus in a two-year-old child. G. N. Bluett<sup>6</sup><sub>Aug. '9</sub> also describes a case in his practice.

R. H. Jenkins<sup>61</sup><sub>Mar. 2</sub> reports a case in a colored boy, aged seventeen, whose head measured thirty-three inches in circumference above the ears.

*Abdominopagus*.—Hirst<sup>1</sup><sub>Mar. 2</sub> describes a case of a double monstrosity, united by the abdominal walls and supplied with a common umbilical cord.

*Sterno-Thoracopagus*.—Suchf<sup>84</sup><sub>Sept. 1</sub> reports a case where the attachment was by thorax, sternum, and the upper portion of the abdomen. A common umbilical cord supplied both. There was also a common heart and liver, but separate stomachs, kidneys, and spleens, also intestinal tracts. There were two heads and four extremities. Joseph Leidy, Jr.,<sup>112</sup><sub>Oct.</sub> describes a case of the same kind of considerable interest.

K. Csaky Podolin<sup>22</sup><sub>Oct. 31</sub> presents a case where the two foetuses were united by the xyphoid cartilage and upper portion of the abdominal cavity, which latter was in common, as were also the liver, spleen, stomach, and the whole intestinal tract, as far as the descending colon. From this position it was double and each foetus was supplied with a separate anus. The organs that were in common were considerably enlarged. The others were normal in size.

*Ischiopagus*.—William Goodell<sup>61</sup><sub>Mar. 17</sub> describes a case of conjoined twins which were united at the hips.

Schultze<sup>60</sup><sub>July 1</sub> also presented a case of the above monstrosity; one of the twins lived forty-one and the other forty-eight hours.

Several cases of parasitic foetus have been published during the past year which could be classed in this group.

That of John Baptist Dos Santos,<sup>1113</sup><sub>1896</sub> although first published by Acton, is again reported. The subject was possessed of a third leg and two distinct sets of genital organs.

Another case is reported by Joseph Jones (collaborator), and also by Lewis Whaley.<sup>207</sup><sub>Sept.</sub> The individual was normally developed above the umbilicus, but presented four lower extremities and two distinct vulvæ and vaginæ.

Bechtinger<sup>23</sup><sub>July</sub> reports a very interesting case of a woman, aged twenty-five years, who possessed three legs, two vulvæ and vaginæ, and four mammæ, but who was otherwise normally developed.

*Parasitic Foetus*.—Several cases of well-marked examples of the above malformation have been presented during the past year.

B. Langly Mills, <sup>2</sup><sub>Aug. 4</sub>, describes a case of a monstrosity where the parasite was attached to the lower part of the sternum. The autosite was perfectly formed, with the exception of an extra lobe to the right ear. The parasitic extremities were well formed and freely movable.

Bland Sutton and S. G. Shattock, <sup>2</sup><sub>Feb. 25</sub>, presented to the Pathological Society of London a Hindu aged seventeen, Laloo, who was being exhibited in London. A whole trunk was suspended from the epigastrium, but was incapable of spontaneous movement. It was possessed of a penis capable of erection and through which urine was passed.



Fig. 8.—KERATOMA HOMINIS. (*British Medical Journal*.)

Edmund Owen, <sup>6</sup><sub>Feb. 11</sub>, describes an anomalous appendage upon a child which Bland Sutton declared to be of a parasitic nature. It was situated at the lower part of the back, a little to one side of the median line, and was between three and four inches in length.

*Cauda Hominis*.—Morgan Vance, <sup>82</sup><sub>Nov. 14</sub>, describes a growth which was located at one side of the gluteal cleft, about the middle of the sacrum. It measured, at birth, one and one-half inches, and when removed at three and one-half years it was four inches long. It resembled very much a pig's tail, but contained no bone, neither possessed any prehensile power.

J. Piatuitzky, <sup>34</sup><sub>Sept. 4</sub>, reports a case operated upon by him successfully. The patient, aged twenty-three, was otherwise well formed. The caudal appendage measured seven centimetres in length and two centimetres in diameter. Microscopical examination revealed

striped muscular fibre, nerves, and vessels, from which he avers it to be a true case of cauda hominis, and not a pathological tumor.

*Keratoma Hominis*.—J. B. Sutton,<sup>2</sup><sub>Feb. 25</sub> describes cutaneous horns on the face of a woman, the one on the forehead being five inches in length.

C. Roberts,<sup>2</sup><sub>Jan.</sub> reports a case which was successfully removed by him, and which grew from a mole and was twisted like an antelope's horn.

*Ectopia Abdominalia*.—W. Kennedy,<sup>2</sup><sub>Nov. 10</sub> describes a case where the abdominal cavity from sternum to pubes was lying open, with liver and intestines exposed and outside. Other complications were present.

D. W. Montgomery,<sup>107</sup><sub>Apr.</sub> records a case where there was a large tumor on the right side of the body extending from the lower margin of the ribs to the crest of the ilium and from the median line in front to the axillary line, and containing the liver, stomach, and large and small intestines. A somewhat similar case is reported by Jacobus,<sup>27</sup><sub>Jan.</sub> Inspection revealed a ruptured translucent sac, about the size of a pint measure, in which the intestines, stomach, left kidney, liver, spleen, and a portion of the uterus were found.

John Buchanan,<sup>6</sup><sub>July 21</sub> describes a case in his practice in which the abdomen of the child presented a large elliptical opening three inches long and two and a half broad, through which protruded the whole of the small intestine, the stomach, and right lobe of liver.

W. Gayton,<sup>6</sup><sub>July 28</sub> records a similar case where the abdomen was open from the ensiform cartilage to within an inch of the pubes. The viscera were plainly visible.

E. Vipont Brown,<sup>6</sup><sub>Aug. 4</sub> records a case of a large tumor of abdomen covered by a thin, transparent membrane.

I. Tracy Simpson,<sup>6</sup><sub>Aug. 16</sub> records a case of a hernia of the abdominal wall, three inches in diameter, into which, when the child cried, a considerable portion of the intestines was forced. The child lived and the skin gradually grew over the transparent membrane constituting the hernial covering.

W. B. Dorsett,<sup>82</sup><sub>Nov. 24</sub> reports a case of exomphalus upon which he operated unsuccessfully.

*Congenital Umbilical Hernia*.—L. Eastwood,<sup>2</sup><sub>Apr. 7</sub> records a case of the above abnormality. Auvard,<sup>194</sup><sub>Feb.</sub> describes a case complicated

by an intestinal diverticulun which opened into the hernia and through which meconium was passed.

*Patent Urachus.*—W. J. Penny<sup>181</sup> describes a case discovered at birth. Surrounding the umbilicus was a dusky-red **areola**, in the centre of which was a sinus reaching to the bladder and from which a thin, watery fluid constantly exuded.

Three cases of open urachus in adults are recorded.

Bramann<sup>226</sup> reports two cases that were operated upon by Bergmann, the first a girl aged twelve, the second a woman aged sixty-three.



## PHYSIOLOGY.

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### BLOOD.

IN experiments made to determine the nature of the liquid exchanges between the blood and the tissues under different physiological and pathological conditions, Cohnstein and Zuntz<sup>246</sup> find that in the normal circulation no difference can be demonstrated between the number of blood-corpuscles in the arteries and veins. But when the circulation in the veins is hindered or stopped completely, the number of corpuscles in this portion of the blood becomes distinctly increased. They point out that this latter fact will probably explain some of the old statements with reference to the difference in the number of corpuscles in the splenic artery and vein, formerly so frequently quoted to prove the part taken by the spleen in the formation of blood-corpuscles, but of late years looked upon with some distrust. They think, also, that they have proved that the capillaries contain fewer corpuscles in them than the large vessels, and that the relative number of corpuscles in the capillaries varies with their width and the velocity of the blood-stream. Any factor, then, that will lead to a change in the calibre of the small vessels or in the velocity of the blood may cause changes in the relative number of blood-corpuscles in different parts of the vascular system—for instance, section and stimulation of the spinal cord, stimulation of the vagus, increase of venous pressure, muscular contractions, and fevers. In one series of experiments normal salt solution was injected into the veins, and at different intervals after the injection the number of blood-corpuscles was determined in a drop of blood. They conclude that filtration of liquid from the blood into the tissues and absorption from the tissues into the blood are not such rapid processes as the recent experiments of Regeczy would seem to

(K-1)

indicate. A rapid increase or decrease in the liquid of the blood happens only when the composition of the blood in salts or other diffusible compounds undergoes a change; under these circumstances the factor causing the change is osmosis and not filtration, and the osmotic exchanges take place with great rapidity. They call attention to the danger of interpreting changes in the relative number of corpuscles as an indication of an actual multiplication or destruction of the corpuscles. Their experiments, as given above, show that such effects may be the result of mechanical causes alone, such as the dilatation or constriction of the capillary vessels. In corroboration of this last statement we possess a number of recent communications which agree in showing that a diminution in the number of corpuscles is not conclusive proof of anæmia, and that, on the other hand, anæmia may exist without any important alteration in the number of the corpuscles. Enumeration of the blood-corpuscles in pathological cases should be accompanied by an estimation of the quantity of hæmoglobin.

Dastré and Loye<sup>300</sup> find that normal salt solution of 0.7 per cent. can be injected into the veins of a rabbit in almost unlimited quantities without injurious effect, provided the injection is not made too rapidly. In one case, with an animal weighing 2.460 kilos, two-thirds of the body-weight, that is, 1.600 kilos, of salt solution were injected into the circulation in the course of four hundred and thirty-four minutes. If the injection was too rapid, exceeding three cubic centimetres of salt solution per kilogram of animal in a minute, death resulted. That such an enormous quantity of liquid could be introduced into the circulation without perceptible injury is explained by the fact that parallel with the injection there was an increased secretion of urine which kept the blood volume within normal limits. They discovered that the increased secretion of urine did not begin until a quantity of salt solution had been injected equal in volume to the blood of the animal. Of this quantity of neutral solution which could be injected without causing an increased secretion of urine, they suppose that about 25 per cent. remained in the blood and increased its bulk to that amount, while the remaining 75 per cent. got into the serous cavities and the tissues and was eliminated later. The injection of such a large volume of saline solution seemed to have no other effect than a thorough washing of the blood and tissues.

It has been known for a long time that transfusion of the blood of one animal to another is followed frequently by local hæmorrhages in the second animal. To explain this Hayem<sup>152</sup><sub>Oct. 27</sub> has carried out a series of experiments upon transfusion. He finds that when the blood of one animal is brought into the vessels of another two principal results follow: First, the red corpuscles lose or may lose their hæmoglobin; second, a greater or less number of masses or concretions form in the blood made up of aggregations of hæmatoblasts (blood-plaques), to which some white corpuscles and a variable number of red corpuscles may be added. It is these masses which, occluding some of the smaller arteries, cause hæmorrhages by embolism. When the masses are very small they are caught chiefly in the vessels of the intestines and spleen; when they are larger they cause more extensive occlusions, especially in the lungs, so that the animal may die in a few minutes from asphyxia.

Wooldridge<sup>182</sup><sub>p. 174</sub> makes a further communication bearing upon his theory of coagulation. This peculiar theory was explained in the ANNUAL of last year. The present paper deals with the properties of the various fibrinogens, which he finds in the blood and also in various tissues of the body, for example, the thymus, testes, brain, liver, kidney, and stroma of the red corpuscles. These latter he speaks of as tissue fibrinogens to distinguish them from the fibrinogens of blood. He investigates the reaction of the fibrinogens toward salts, acids, artificial gastric juice, etc., and finds that they are all extremely sensitive to the usual reagents employed to precipitate globulins. Moreover, the fibrinogens, however precipitated, always suffer in consequence a more or less decided change in their properties. The nature of this change he does not state definitely, but assumes that inasmuch as fibrinogen, according to his theory, is a mixture of lecithin and albumen, the change brought about by precipitation consists either in an alteration of the lecithin or in a difference in the way in which it is combined in the molecule. He gives no proof for this hypothesis. The general fact emphasized in his paper, that fibrinogen undergoes a change after precipitation, is undoubtedly true, to some extent, at least, for the fibrinogen of blood, especially after repeated precipitations, since one frequently notices after such precipitations that the fibrinogen becomes less soluble in saline solutions.

The nature of the fibrin ferment which starts the process of coagulation in the blood has proved a difficult subject to investigate, and little or no real knowledge has ever been obtained concerning it. In a recent paper Halliburton,<sup>1005 178  
44, No. 220; 7, 2, p. 220</sup> professes to have solved the problem. Fibrin ferment, according to him, is an albumen contained in leucocytes both in the blood and in the lymphoid tissues, and possesses the properties of a globulin. He names this albumen "cell-globulin," and gives a variety of experiments to show that it can be extracted from lymph-cells, that it has a marked influence in hastening the coagulation of salted plasma, and that it is identical with what has heretofore been known as fibrin ferment. As a crucial experiment to test this last statement he made a quantity of ferment from cat's serum, and found that, though it contained a proteid, as shown by the xanthoproteic reaction, this was not present in sufficient quantities to permit of a satisfactory examination. But when the solution was concentrated at 40° C. the proteid present was found to be a globulin (he supposes, in accordance with his theory, that it was cell-globulin, but gives no proofs), coagulating at 75° C. Moreover, when precipitated by  $MgSO_4$ , the precipitate, after being washed and dissolved, gave a strong ferment action. He sums up his results in the following general conclusions: 1. Lymph-cells yield, as one of their products of disintegration, a globulin—cell-globulin—which has the properties hitherto ascribed to fibrin ferment. 2. Fibrin ferment as extracted from the dried alcoholic precipitate of blood-serum is found on concentration to be a globulin with the properties of cell-globulin. 4. Serum-globulin (paraglobulin) prepared from hydrocele liquid does not possess fibrinoplastic properties. 5. Serum-globulin, prepared from blood-serum, has marked fibrinoplastic properties. This happens because the serum contains some cell-globulin derived from the disintegration of white corpuscles. 6. The cause of the coagulation of blood is primarily the disintegration of the white blood-corpuscles. They liberate cell-globulin, which acts as a ferment, converting fibrinogen into fibrin. It is not possible in the limited space of a review to criticise in detail the experiments given in the paper upon which these very important conclusions are based. In some respects the experiments do not seem to be altogether satisfactory. If cell-globulin is an albumen different from the ordinary paraglobulin of blood, there ought to

be some reactions given to distinguish one from the other. But, on the contrary, they seem to behave in all essential points, even to heat coagulation, in exactly the same way. In ordinary serum the author supposes these two bodies to be present, but gives no means of separating them or of proving their separate existence. So the pure cell-globulin, prepared from leucocytes, has only the properties of paraglobulin. Halliburton mentions, it is true, two points of difference which he thinks distinguishes the two globulins: 1. That the cell-globulin is fibrinoplastic, that is, causes the formation of fibrin, while the paraglobulin is not. But, inasmuch as he is attempting to prove that fibrin ferment is a cell-globulin, it is hardly fair to establish the existence of cell-globulin by saying it is that substance in serum which acts like fibrin ferment. 2. That cell-globulin prepared from leucocytes under certain conditions coagulates at a lower temperature than paraglobulin, namely, at 60–65° C., though normally the two have the same temperature of coagulation. The condition referred to is the presence in the liquid of a considerable amount of NaCl. This is not satisfactory, as the author himself has shown that the presence of NaCl in a solution of albumen materially lowers the coagulation point. Moreover, in a number of cases the experiments seem to be incomplete or badly controlled, so that one is unwilling to accept readily his conclusions. For instance, as stated above, a solution of fibrin ferment, prepared from blood-serum by Schmidt's method, showed the presence of a trace of some albumen, and when the solution was concentrated at low temperatures the albumen was found to have the properties of a globulin, coagulating at 75° C. and precipitating upon saturation with  $\text{MgSO}_4$ . Since the solution also showed ferment properties he concluded that the ferment and the globulin were identical. When, on the other hand, hydrocele and other serous exudations were treated by this same method a solution was finally obtained which had no fibrinoplastic properties, but this solution also gave evidence of containing a trace of some serum-albumen. Halliburton, however, did not concentrate this at a low temperature to find whether it was a globulin, but concluded that ferment cannot be prepared from hydrocele because it contains only paraglobulin, while serum contains both paraglobulin and cell-globulin. Evidently the conclusion is not proved by the experiments.

Jaquet,<sup>88</sup><sub>v.12,p.268</sub> gives the result of a new analysis of hæmoglobin. He used dogs' blood and employed the same method as Zinoffsky in his recent analysis of the hæmoglobin of horses' blood. The results show that the elementary composition of the hæmoglobin in the two animals is not identical, the most marked difference being in the sulphur. In the horse there is one atom of iron to two of sulphur, and in the dog one of iron to three of sulphur. The results of the two analyses were as follows:—

Horse.					Dog.				
C,	.	.	.	51.15	C,	.	.	.	53.91
H,	.	.	.	6.76	H,	.	.	.	6.62
N,	.	.	.	17.94	N,	.	.	.	15.98
S,	.	.	.	0.390	S,	.	.	.	0.542
Fe,	.	.	.	0.335	Fe,	.	.	.	0.333
O,	.	.	.	23.43	O,	.	.	.	22.62

#### MUSCLE.

The phenomena of rigor mortis have been investigated by Bierfreund.<sup>246</sup><sub>v.45,p.106</sub> While it has been denied frequently that the rapidity of the onset of rigor mortis depends in any way upon the nervous system, Bierfreund has obtained results which seem to give decided evidence in favor of an influence of the nerves upon this process. Thus, section of the sciatic of one leg in an animal killed by bleeding delayed for ten or twenty minutes the appearance of rigor in that leg as compared with the one on the uninjured side. So, also, hemisection of the cord below the pyramidal decussation caused a very distinct lengthening of the time of appearance of rigor on that side. He states, moreover, that after extirpation of one of the cerebral hemispheres rigor mortis appeared later on the corresponding (presumably the opposite) side. Connection with the central nervous system, then, undoubtedly hastens rigor mortis, but the reason for this action lies wholly in the dark. It cannot be owing to the discharge of nerve impulses from the centres, since he finds that if both sciatics are cut, and then one of them is stimulated by subminimal electric shocks, the result is to retard rather than to hasten the development of rigor mortis on that side. In rabbits' muscles he notices a remarkable difference in the time necessary for rigor between the red and the pale muscles. The former enter into rigor much more slowly, but the shortening of the muscles is greater and the duration of the rigor longer. The red muscles may be in rigor some time after the pale

muscles are completely out. Temperature, he finds, has a distinct accelerating effect upon the appearance of rigor, while narcotics, on the contrary, hinder its development. Perhaps the most interesting point in his paper is his proof that putrefaction has nothing to do with the release of a muscle from rigor. He proves that the injection of germicides, such as corrosive sublimate, one part to ten thousand of normal salt solution, and carbolic acid, does not prevent the muscle from passing out of rigor. On the other hand, in muscles which have been in rigor and are again relaxed no putrefactive bacteria can be detected. He believes that rigor mortis is like a prolonged muscular contraction, and adduces this as some evidence to support Hermann's well-known view that the chemical changes in rigor mortis and muscular contraction are essentially of the same nature.

Feuerstein<sup>246</sup><sub>v. 62, p. 367</sub> shows that the absolute power of a muscle contraction depends largely upon the initial tension to which the muscle is subjected before the contraction begins. The absolute power, according to his experiments, may vary from one- to ten-fold, with the variation in the initial tension. He describes a simple apparatus by means of which the absolute power can be conveniently measured under different tensions. He claims that his method is not only simpler, but much more certain than the method of after-loading usually employed in such determinations.

It has been known for a long time that, as in the rheoscopic frog preparation, a nerve may be stimulated by electrical changes in a muscle with which it is in contact, but heretofore no similar results have been obtained with muscles. Kühne,<sup>391</sup><sub>v. 6, p. 288</sub> however, has shown recently that under certain conditions such secondary contractions can be obtained from muscles. The typical experiment was made upon the frog's sartorius. The lower end of this muscle is known to be free from nerve-fibres. If this nerve-free portion was cut off and partially slit in its long axis so as to make two limbs and a common connecting-piece, the stimulation of one of the limbs did not cause a contraction in the other, although here, as in the paradoxical contraction with nerve-fibres, the muscle-fibres in part of their course lay side by side. But if the undivided end of the piece of sartorius, where the fibres lay side by side, was compressed strongly, then even weak stimulation of one limb was followed by a contraction of the other. Compression of

the fibres had made them more irritable, so that the action current of the fibres stimulated was itself sufficient to stimulate the adjacent fibres.

Roth<sup>246</sup><sub>v. 4, p. 21</sub> discusses anew the old question of the action of frequently repeated electrical stimuli upon muscles and nerves. He used induction shocks in his experiments, and produced the variations in the primary current by the vibrations of the diaphragm of a Blake microphone. The diaphragm was thrown into vibration by pipes of known pitch sounded before it. When the primary current was generated by one Gassner's dry-element stimuli at the rate of five thousand per second, it failed to produce tetanus. His conclusions in their most general form are that the existence of tetanus in a muscle not fatigued is dependent upon two variables, the intensity of the current and the frequency of the stimulus. With a constant strength of current, when the rapidity of stimulation reaches a certain point it no longer causes a tetanus, but simply a making shock, as with constant currents. If the frequency is still further increased, at a certain definite limit the muscle fails to react at all. With a constant rapidity of stimulation sufficient to cause tetanus there is a definite lower limit to the strength of current which will produce the tetanus.

Apropos of this last paper, Sewall<sup>178</sup><sub>v. 3, p. 22</sub> calls attention to the discrepancies in the results of the many investigators who have attempted to determine the maximum frequency of stimulation of nerve and muscle capable of producing tetanus. He thinks that this discrepancy is a necessary result of the method of electrical stimulation employed, and points out that an explanation of this was contained in some work done by him several years ago.<sup>178</sup><sub>v. 2, p. 175</sub> In this work the mutual influence of two separate induction currents acting simultaneously, or nearly so, upon a motor nerve was discussed. He showed that an ineffective induction current might have a direct weakening or strengthening action, according to its direction, upon the result of an effective induction current acting at the same time, or, at least, not more than 0.001 second later. This result was caused, presumably, by the polarizing action of the weak current upon the nerve. Sewall thinks that when alternating currents are used the polarizing influence of each single current should have its effect upon the stimulating power of the succeeding one, and that when the interruptions of the current are sufficiently



rapid each new cathodal phase may be developed in a part of the nerve still in a condition of anelectrotonus, and hence will be ineffective and tetanus will fail. Since the ratio of the polarizing to the stimulating power in the rapidly alternating currents may vary with the method of interrupting the current, it is easy to understand how different investigators have arrived at such widely varying results. From this stand-point the method of electrical stimulation carries within itself a hinderance to the satisfactory solution of the given problem, namely, the maximum number of rapidly following stimuli which is capable of causing tetanus.

It is generally taught that when a muscle or nerve is stimulated by an induced current the stimulus starts from the cathode, the duration of the current being so brief that the breaking or anodic stimulus is not effective. Regeczy<sup>246</sup><sub>v. 44, p. 127</sub> thinks that he has furnished an experiment which demonstrates with certainty that with an induced current of a certain strength the stimulus starts from both poles, that, short as this current is, it gives both an opening and a closing shock. In his experiment the muscle was stretched by a certain weight, and by an ingenious device, two wire quadrangles piercing the muscle, he could record the movements of the upper and the lower halves upon the same plate. When the two poles of the induced current were placed at the two ends of the muscle and a current passed, the two myograms recorded were found to begin and end and reach the maximum point of shortening at the same time; so that the myogram of the upper half was as long as that of the lower, differing only in its steepness. This showed that a summation had taken place in the upper half and demonstrated the bipolar stimulation caused by the induced current. In a previous paper<sup>256</sup><sub>v. 43, p. 633</sub> the author had asserted that the stimulation of muscle by induced currents follows the law of contraction discovered by Pflüger for constant currents, that is, with weak induction currents the stimulus starts from the cathode alone, a making shock, while with stronger induced currents, as stated above, the stimulus is double, starting from both poles. Furthermore, both the anodic and cathodic stimuli of the induced current are stronger when they result from the breaking of the primary current than when caused by the making of that current; indeed, the anodic stimulus of the breaking primary current is greater than the cathodic stimulus of the making current.

Regeczy,<sup>246</sup><sub>v. 22, p. 261</sub> makes also an important contribution to our knowledge of the latent period of muscular contraction. It is known that the latent period of a muscle is influenced by a number of conditions, such as load, strength of stimulus, after-loading, etc., not to mention such important factors as temperature and fatigue. It has been almost universally accepted by physiologists that the latent period is a genuine phenomenon, that it is a period of apparent rest following stimulation, during which, however, important changes are taking place preparatory to the actual shortening. It seems from recent works of Tirgerstedt and others that the length of the latent period has been much overestimated. In the present paper Regeczy endeavors to show that no latent period of stimulation really exists, that the so-called latent period is dependent upon the elasticity or extensibility of the muscle alone. He explains his idea by using the example given by Gad, as follows: If one holds in his hand a long caoutchouc string with a weight at the end, and moves the hand suddenly upward, the elastic string is at first lengthened and a distinct interval of time will intervene before the weight begins to move upward. Allowing the muscle to represent the elastic string, the latent period that we observe before the shortening begins is similarly a result of the elasticity of the muscle. As proof for this view he found that when a muscle is attached to a recording lever and is stimulated at its upper end there is a slight lengthening of the muscle before the contraction begins; moreover, the latent period is longer when the muscle is stimulated at its upper than when stimulated at its lower end; it is longer the smaller the cross-section of the muscle and the greater the length of the muscle used. So the latent period can be shortened by stimulating the muscle in the middle, the stimulus spreading in both directions, or by stimulating the muscle at several points along its length. All of these facts tend to support the view that the latent period is due to the elasticity of the muscle, the pull of the portion first entering into contraction serving to extend the other portion, as with the elastic string before the shortening begins. He shows that anything which tends to diminish this effect will shorten the latent period, and that, consequently, a true latent period of stimulation does not exist, the muscle beginning to contract at the instant of stimulation.

By means of a new and convenient interrupter and a record-

ing apparatus more delicate than those usually employed Campbell<sup>215</sup><sub>7.4.12</sub> has been able to show that the number of stimuli necessary to cause complete tetanus is greater than that usually accepted. With a frog's gastrocnemius at  $23\frac{1}{2}^{\circ}$  C. thirty-seven stimuli a second were not sufficient to produce complete tetanus, though twenty-seven has been the number usually given. For the neck-retractor muscles of the terrapin, upon which most of his work was done, the following figures were obtained:—

Temperature.	No. of stimuli a second necessary for complete tetanus.
4° C. . . . .	1
9° C. . . . .	5
21° C. . . . .	25
28° C. . . . .	34

In addition to the influence of the temperature, well illustrated in the above table, Campbell found that the more extensible a muscle is the fewer stimuli a second will suffice to tetanize it. Tetanus could be obtained with very weak subminimal stimuli when sufficiently rapid, though when repeated at intervals of a second no contraction at all was produced. The velocity of the wave of contraction in the terrapin's muscle was found to vary between two and 2.6 metres a second in the extra-polar regions. When the stimulating poles were separated by a long stretch of muscle (sixty-five millimetres) the stimulus was found always, with induction shocks, to start from the cathode and to travel through the intra-polar region with an increased velocity of thirteen metres a second. In this respect Campbell's work contradicts that of Regeczy's given above. The load raised by the muscle had a decided effect upon the velocity of the wave of contraction, the velocity increasing with the load. When the load was very heavy, seventy-five grammes, the two ends of the long muscle contracted at the same instant, or the whole muscle entered into contraction at once, so that a contraction wave, strictly speaking, was not present, though, presumably, the latent period must have been greatly increased. In the same journal a number of interesting experiments upon terrapins' muscle are given by Kemp. The experiments refer to Pflüger's law of contraction, the velocity of the stimulus in the muscle, etc. With regard to the first he found that when the muscle was moderately weighted it obeyed Pflüger's law, but when the weight was small it did not obey this law.

Von Frey<sup>182</sup><sub>p.215</sub> continues his investigations upon the tetanic contractions of unloaded muscles. Some of the results of his previous work were given in the ANNUAL of last year. In this communication he describes chiefly the effect of variations in the time between successive stimuli upon the form and especially the height of the compound contraction. One of his most interesting results is that, according to the time interval between two successive stimuli, the height of the resulting compound contraction may exceed or fall short of that of a simple contraction. In the first case the heightened contraction is not, in his opinion, a true summation, such as occurs with loaded muscles; he, therefore, prefers to call it a compound contraction. In the second case, the second stimulus seems to cause a sort of inhibition of the first, or perhaps it might be more truly described as due to an interference between the first and second contractions. It is possible, he thinks, that the tendencies to a change in the form of a muscle in consequence of two successive stimuli may add themselves algebraically to give either a positive or a negative result compared with the height of the simple contraction. When the contractions were recorded by laying a light lever across the muscle stretched on a cork plate, so as to get a thickening contraction curve instead of a shortening curve, it was found that the height of the compound contraction is greatest when the second stimulus falls into the ascending limb of the first contraction, but when it falls into the descending limb (interval of about 0.1 second) the compound contraction is lower than the single contraction.

Chapman and Brubaker<sup>1018</sup><sub>7</sub> give, in two communications, the tabulated results of a number of experiments made, first, to determine the electro-motive force of muscle and nerve, and, second, the resistance of muscle and nerve to the passage of an electrical current. The average electro-motive force of the gastrocnemius muscle of the frog was found to be 0.0696 of that of a Daniell element, and that of the sciatic nerve 0.0237 D. The ratio of the longitudinal resistance of the muscle to the transverse was 1 to 6.5, while with the nerve the ratio was as 1 to 3.

#### CIRCULATION.

The difficult subject of the origin and nature of the rhythm of the mammalian heart is discussed by McWilliam<sup>182</sup><sub>p.17</sub> in an inter-

esting way from the stand-point of modern contributions to cardiac physiology. From his own work he shows that two laws governing the contractions of cardiac muscle, which have been established for the frog's heart, hold good also with the mammalian heart: (1) that any stimulus strong enough to be effective calls forth a maximal contraction, and (2) that there is a rhythmic rise and fall in the excitability of the heart. The condition of least excitability follows immediately after a contraction, at which time, to use the expression of Marey, the heart-muscle is refractory toward direct stimulation. The origin of the spontaneous rhythm of the heart is fully discussed. He gives a number of new cases in which he obtained a reversal of the normal rhythm of the heart, the contraction beginning in the ventricle and spreading thence to the auricles. The most interesting variation of the normal rhythm of the mammalian heart which he records is that, in stimulation of certain branches of the vagus in the cat, one gets sometimes a complete stand-still of the auricles and great veins, while the ventricles continue to beat. From this and other facts we must admit that the different parts of the heart have an independent rhythmic power. That the rhythmic contraction usually starts at the mouths of the great veins means, probably, as stated formerly by Gaskell, that the muscular tissue there has the property of rhythmic contraction most highly developed. If we admit that the origin of the contraction at this point is myogenic, it is easy to understand how it spreads in a progressive wave over the auricles. But how in the mammalian heart this contraction passes from the auricles to the ventricles is a mystery, as there is no muscular connection between the two. A possible explanation might be found in the fact that the musculature of the auricles is continued into the auriculo-ventricular valves, and these in turn are connected with the muscle of the ventricles through the chordæ tendineæ. In this way one might suppose that the contraction of the auricles, by pulling up sharply the auriculo-ventricular valve-flaps and stretching the chordæ tendineæ, could stimulate mechanically the ventricular muscle and bring on its systole. McWilliam shows by a decisive experiment that this hypothesis is untenable. The ventricles were cut across in their upper third, completely severing the chordæ; nevertheless, the basal portion of the ventricles, still in connection with the auricles, continued to beat rhythmically in

proper sequence. He is forced, finally, after discussing the various theories, to conclude that "the propagation of the contraction from auricles to ventricles is effected through the nerves that pass between these parts." Anything more definite as to the nature and anatomical position of this nervous connection cannot yet be stated. With reference to the propagation of the wave of contraction over the auricles from its origin at the mouth of the great veins till it reaches the base of the ventricles, it is evident from McWilliam's experiments that this propagation does not depend upon the passage of nerve impulses from some common centre to the various parts of the auricle, but, on the contrary, the wave travels from muscle-cell to muscle-cell, whether or not the origin of the wave is myogenic or nervous.

The subject of heart innervation receives a lengthy contribution from Pawlow also.<sup>246</sup>  
p. 100, 37 The results of his work tend to make the present theories more complex rather than to simplify them. From experiments made upon the dog's heart he concludes that the work of the heart is regulated by four efferent nerves, or, more properly, by four kinds of efferent nerve-fibres, viz.: slowing, accelerating, weakening, and augmenting fibres. In the branches that enter into the cardiac plexus from the vago-sympathetic trunk and the annulus of Vieussens he believes that he can distinguish certain definite branches which contain constantly one or more of these sets of fibres. His statement is based, of course, upon actual stimulation of the various branches, and study of the kymographic tracings obtained. He explains the position of these branches by means of a figure representing the vago-sympathetic trunk and its relations to the thoracic sympathetic upon the right side in the dog. In the strong inner branch he finds constantly, and sometimes exclusively, augmenting fibres. All the remaining heart-fibres may be found in this branch associated with the augmentors, but most frequently the accelerators. The slowing or inhibiting fibres occur constantly and prominently in the lower inner branches, and mixed with them also frequently the accelerators. The external branches show a distinct and strong accelerating action upon the heart. The upper external branch contains sometimes augmenting fibres. The upper inner branch, when it is present, has in it usually some accelerators, either alone or mixed with inhibiting or augmenting fibres. The weakening fibres are

divided among the inner branches, but one finds them most frequently in the strong inner branch.

#### RESPIRATION.

One of the best-established points in the physiology of respiration is that muscular exertion increases the rate and extent of the respiratory movements. The explanation of this fact seems to be quite easy: The increased muscle metabolisms use up more oxygen, and, as a consequence, the blood leaving the muscles is more venous than normal and stimulates more violently the respiratory centre. Geppert and Zuntz, <sup>246</sup><sub>v. 2, p. 120</sub> however, have put this and other theories to the test of experiment. Their arguments and experiments are as follow: They start with the proposition that muscular contractions must make themselves felt upon the respiratory centre, either by causing some change in the blood or by stimulating directly afferent nerve-fibres connected with this centre. The latter possibility was quickly ruled out, because in animals in which the muscles of the hind legs were cut off from all nervous connection with the respiratory centre by section of the dorsal cord artificial stimulation of their muscles still caused the usual effect upon the respirations. The stimulus, then, must consist in some change in the composition of the blood which acts either peripherally upon the endings of the nerves in the lungs or centrally upon the medullary centre. The latter view was shown to be probable, because section of the vagi, the sympathetics, or the cervical cord at the seventh cervical vertebræ produced no change in the effect of muscular contractions upon the respiratory movements. They are compelled to believe that the blood is the carrier of the respiratory stimuli formed during muscular contractions, and that the central nervous system (respiratory centre) is the place where the stimuli take effect. They next attempt to determine the character of the respiratory stimuli. The usual theory is as stated above—namely, there is some change produced in the blood-gases. But they were unable to corroborate this view. After a long series of experiments they concluded that muscular contractions cause no constant change in the absolute quantity of the blood-gases or in the tensions under which they are held in the blood; that is, there was no distinct diminution in the oxygen nor increase in the carbon dioxide of the blood. By exclusion in this

way of other possibilities they arrived at the new and important conclusion that in muscular work substances are formed in the muscles which pass into the blood, and, upon reaching the respiratory centre, stimulate it directly, causing more or less pronounced dyspnoëic respiratory movements. They were not able to isolate these substances nor to give any definite theory as to their nature.

An effort in this direction was made by Loewy <sup>246</sup><sub>v. 42, p. 291</sub> in a paper published in the same journal. Assuming, upon the basis of the work done by Geppert and Zuntz, that during muscular activity respiratory stimuli are formed in the muscles and given to the blood, he endeavored to determine whether the substance or substances formed are normally removed from the blood by the kidneys. The result of his experiments, which were made upon rabbits, is against such a view. In one series the urine taken from an animal after strong muscular contractions was injected into the vein of another rabbit, but with no greater effect than that following the injection of urine from a resting animal. In a second series the frequency and depth of the respiratory movements were recorded for a rabbit while resting, and again after tetanizing for some time the muscles of the hind legs. In the same rabbit, then, the blood-vessels going to the kidneys were ligated and the muscles of the hind legs again thrown into tetanus, but the effect upon the respiration was no stronger than in the normal rabbit. Apparently, the substances formed during muscular activity which stimulate the respiratory centre are not removed from the circulation by the kidneys. Loewy concludes that they are easily oxidizable compounds and are destroyed in the body.

Still another contribution on this same subject appears in the same journal. <sup>246</sup><sub>v. 42, p. 291</sub> Geppert and Zuntz had found in their work that during the dyspnoëic excitation of the respiratory centre after muscular exertion there is a distinct diminution of the alkalinity of the blood. In this paper Lehmann pursues this observation somewhat further. He finds that injection of acid into the veins also stimulates the respiratory centre, and believes, therefore, that the action of muscular contractions on the respirations is caused by the acidulation or diminution in the alkalinity of the blood produced thereby. The stimulating action of acid injected into the blood may be removed by subsequent injection of alkali, though a decided increase in the alkalinity of the blood also acts as a stimu-



lus to the respiratory centre. He thinks that the action of carbon dioxide on this centre is only a special case of the effect of acids in general.

The theory of the action of the respiratory centre in the medulla which is most generally accepted is that first fully elaborated by Rosenthal. The theory teaches that the normal stimulus of the centre is the venosity of the blood; that the normal venosity being sufficient to arouse the usual quiet respiratory movements of eupnœa, any increase in the venosity will lead to dyspnœa and a decrease will tend toward apnœa. Nevertheless, a number of good observers have questioned whether the gaseous composition of the blood has any direct effect upon the respiratory centre. It is gratifying, then, to find that Bienfait and Hogge,<sup>52</sup><sub>v. 2, p. 4</sub> working under the direction of Frédéricq, have put the theory to the test of what seems to be a crucial experiment—an experiment which had been attempted before by others in a somewhat modified form, but which had hitherto met with failure because of the coagulation of the blood. Their operation was to take two rabbits or dogs, A and B, and to ligate the vertebral arteries and the carotid of one side in both animals. The peripheral end of the other carotid in A was then connected with the central end of the carotid of B, and *vice versa*; so that the brain of each animal was supplied by blood from the heart of the other. Now, when animal A had his trachea completely or partly closed it was animal B, whose head received the venous blood of A, which showed dyspnœic respiratory movements, while A, on the contrary, manifested, if anything, a tendency toward apnœa. In a second series of experiments the head of an animal, rabbit or dog, was cut off from connection with the heart and kept alive by an artificial supply of blood. When this blood was saturated with CO<sub>2</sub> dyspnœic respiratory movements followed, and when the well-ærated blood was turned on again normal breathing again ensued. The experiment gives satisfactory and direct proof that the respiratory centre is affected by changes in the gaseous contents of the blood in accordance with the accepted theory. The method of experimentation employed by the authors ought to enable them to analyze this action of the gases more thoroughly—to determine whether it is excess of CO<sub>2</sub> or absence of O, or both, which stimulate the respiratory centre in dyspnœa.

In a paper by Cohnstein and Zuntz,<sup>246</sup><sub>v. 2, p. 322</sub> on the physiology of

the mammalian foetus, and containing chiefly observations upon the physiology of the respiratory centre, still further evidence is given for the generally accepted views as to the way in which that centre acts. They find that the first respiratory movement of the newborn animal causes a distinct though small increase in blood pressure in consequence of the aspiration of blood from the placenta, the umbilical artery at the same time closing from a contraction of its circular muscles. The oft-debated question of the cause of the first respiratory movement and the apnœic condition of the foetus *in utero* they decide differently from the recent conclusions of Preyer. In their experiments, made chiefly upon the sheep, they find, in opposition to Preyer, that if the placental circulation is left intact and the foetus is exposed enveloped in its membranes stimulation of it in various ways will not produce respiratory movements. As soon, however, as the placental circulation is stopped the foetus begins to breathe, because of the increased venosity of its blood. The first respiratory movement, in their opinion, is not brought about by reflex excitation of the medullary centre from cutaneous stimulation, but, in consequence of the interruption of the placental circulation, by the direct action of the venous blood on the centre. They prove, also, that the irritability of the centre in the newborn is less than in later life. This will help to explain, of course, why the foetus remains apnœic, though its blood may be more than sufficiently venous to stimulate the respiratory centre when viewed from the stand-point of our experience with adult animals. They state, furthermore, that if from any cause the blood of the foetus becomes sufficiently venous to stimulate the centre and cause an inspiratory movement, this will be at once inhibited by the entrance of the amniotic liquid into the nostrils. As an explanation of this it may be stated that it is well known that in the adult the contact of liquids with the nasal mucous membrane will inhibit the respiratory movements for a certain variable time, giving what is known as the "diving reflex." The effect is most marked in the aquatic birds, and its usefulness is implied in the name given to the reflex. The authors show, experimentally, that the foetus reacts in the same way, so that we have here a self-regulating mechanism for the prevention of foetal respirations. With reference to the nutrition of the embryo they give conclusive proof, for the first

time, apparently, that not only gases, but also water and soluble food-stuffs, such as sugar, pass from the maternal to the foetal blood. To demonstrate this the uterus of a pregnant animal was opened, a foetus extracted, and a specimen of its blood and that of its mother also was examined. The abdominal wound was then sewed up and a solution of sugar slowly injected into the circulation of the mother. After the completion of the injection the blood of the foetus was again examined and the result proved that a rapid diffusion of sugar had taken place through the placenta; a corresponding amount of water, of course, must have passed from the blood of the foetus to that of the mother, and this was detected by the enumeration of the blood-corpuscles in the blood of both animals.

In a second paper Loewy<sup>246</sup> takes up the respiratory centre in the medulla and the conditions of its activity. Here, again, the results of his work tend to uphold the more generally accepted views, which in late years have been subjected to a great deal of adverse criticism. The author endeavors to determine, first, whether the respiratory centre when cut off from all connection with afferent nerves still discharges its impulses rhythmically. After such an isolation of the centre by section of the medulla above the centre, section of the two vagi, etc., he finds that the respiratory movements are slower and deeper, though in a given unit of time the total volume of air breathed is less, and that the respiratory movements are perfectly rhythmic. This last result is very important and contradicts the conclusion to which Marckwald came to in his valuable paper published a year or two ago. Loewy found, further, that the respiratory centre isolated in this way from all afferent impulses is still sensitive to changes in the gaseous contents of the blood, for when the quantity of  $\text{CO}_2$  in the blood was increased there was a corresponding increase in the depth of the inspirations and in the quantity of air respired in a given time. Finally, he found no difficulty in making animals with the respiratory centre isolated from afferent impulses completely apnoëic, which would tend to show that the apnoëic condition of the centre depends upon some change in the gases of the blood, and is not aided or caused by stimulation of the vagus or other afferent nerves. In this point the author supports the older views and opposes the results of a number of recent

investigations, the tendency of which was to show that for the production of complete or absolute apnoea rhythmical stimulation of the vagus is necessary in addition to the more thorough ventilation of the lungs.

In a paper published entirely independently of the last, Franck and Langendorff<sup>182</sup><sub>p. 200</sub> come to conclusions which are in complete harmony with those of Loewy. They find that in rabbits after the respiratory centre is cut off from all centripetal influences by section of both vagi and removal of the brain anterior to the medulla the respiratory movements, though convulsive, are regular and rhythmic. The respirations take on the character of tonic contractions, especially the inspirations. When the vagi alone are cut, or the medulla only is severed from its connections with the brain, the character of the respirations is not altered. It is necessary for both operations to be performed to get the convulsive respiratory movements. In an animal in which the vagi are cut removal of the cerebral hemispheres, the optic nerves, and the thalami does not bring in the convulsive breathing; only when the corpora quadrigemina are destroyed in addition does this effect come out. The authors do not interpret this result to mean that normally afferent impulses descend from the corpora to the medullary centre, and that it is the falling away of these impulses which brings on the effect described. If one performs exactly the same operation, but leaves the vagi intact, no disturbance of the respiratory movements follow. This they explain by the regulating action of the vagi on the respiratory centre after the manner first described by Hering and Brewer. In support of this explanation and in confirmation of Hering and Brewer's theory of the self-regulating action of the lungs they give the following experiment: The left vagus in a rabbit was cut and the cerebrum and mid-brain removed; the respiratory movements remained normal. Now the pleural sac of the right side was opened, causing collapse of the lungs; at once the respiratory convulsions followed as though the right vagus had been cut. If the wound in the thorax was closed again, so that the lung on that side was expanded to some extent at each inspiratory widening of the thorax, the breathing again approached the normal, thus showing that at each expansion of the lungs the vagus fibres are stimulated, and in this way exercise an important regulating action upon the discharges from the

respiratory centre. Like Loewy, they found, also, that the isolated respiratory centre was affected by an increase in the venosity of the blood, and, moreover, could be made apnœic in the usual way. The complete agreement between them and Loewy on this latter point is very valuable, as it seems to establish beyond question that the production of apnœa is not dependent in any way upon the action of the vagus nerve.

It is well known that the vagus nerve exerts a tonic action upon the respiratory centre of such a character that when the vagi are cut the respirations become slower and deeper. This effect, however, only appears after the section of both vagi; if one of the nerves is intact its regulating action is sufficient to keep the whole centre acting normally. Loewy<sup>216</sup><sub>v. 42, p. 273</sub> endeavors to discover what causes this tonic action of the vagus. He concludes that it depends entirely upon the expansion of the lungs, that the tonic stimulus of the lung-fibres of the vagus is, therefore, a mechanical one, and appears as soon as the lungs pass out of their atelectatic condition. To demonstrate this point he submits two series of experiments. In the first the chief bronchus of one lung was occluded, and after some time the lung on this side became completely atelectatic by absorption of the contained gases. The vagus nerve of the other side was then cut, and immediately the respiratory movements changed as they do in the normal animal after section of both vagi. If the vagus on the side of the collapsed lung was next cut no additional effect could be noticed, showing that it no longer carried tonic impulses to the medulla. In the second series the animal was made to breathe pure oxygen until all of the nitrogen was removed from the lungs. The pleural sac on one side was then widely opened; the lung, of course, collapsed, and, inasmuch as it contained only oxygen, quickly became atelectatic, owing to the absorption of the oxygen by the blood. The vagus of the other side was cut, and, as before, the respiratory movements changed as in the normal animal after section of both nerves. Then the atelectatic lung was again expanded by artificial respiration, and immediately the respiratory rhythm changed back to normal, showing that the vagus on that side began to exert its tonic regulating action on the centre as soon as the lung was expanded. That it is the expansion which stimulates the vagus and not the venous blood coming to the lungs was shown

by an experiment similar to the one just described, except that hydrogen was used to expand the atelectatic lung, the general result being the same. As a specimen of the results obtained in the last series of experiments the following record may be given: Animal used, rabbit. First, lung of right side made atelectatic; frequency of respirations, sixty-six. Second, vagotomy of left side; frequency of respirations, thirty-four. Third, right lung again expanded; frequency of respirations, sixty-three.

Langendorff<sup>182</sup> gives a short description of the mechanism of the respiratory movements in the frog. He maintains, in opposition to the general view of physiologists, that the expiratory movement of the frog is not a muscular act, but due simply to the elastic recoil of the expanded lungs. As a proof of this it was found that after the removal of the muscles of the back, front, and sides of the animal's body the lungs still gave an expiratory collapse after they had been expanded by the throat movements.

The air which still remains in the lungs after the deepest possible expiration is known as the residual air. The numerous determinations of the amount of this residual air in man have differed very much among themselves, the lowest being that of Sir H. Davy (1803) and Pflüger and Koch's (1884), averaging about six hundred and seventy-two cubic centimetres, and the highest that made by Neupauer (1879), about nineteen thousand eight hundred cubic centimetres. Hermann<sup>246</sup> directed one of his students to attempt to measure this air directly by the following method: The thorax was compressed as much as possible to imitate forcible expiration, and the trachea was then securely closed. The lungs were taken out and their volume determined by the amount of displacement they caused; subtracting from this the volume of the lungs, easily determined, the remainder was the volume of the residual air. The idea of the experiment was that the method, though rough, was direct, and the results ought to indicate which of the above extremes is nearer to the truth. By a mistake in the calculation an erroneous result was published first and corrected subsequently in a note.<sup>246</sup> For the normal lung the average result was 914.5 cubic centimetres, indicating that the extremely high values given to the residual air by some observers are probably incorrect.

The injurious effect of breathing expired air is well known,

but an explanation of it beyond the fact that it is not owing to the excess of  $\text{CO}_2$  has never been obtained. Brown-Séguard and d'Arsonval have made some experiments which seem to throw a little light upon the subject.<sup>428</sup> They find that the aqueous vapor in the expired air, when condensed and injected into the blood-vessels of pigeons, rabbits, etc., causes death. Or if pure water is injected into the lungs of an animal, and after some time a portion of it is withdrawn, this water also, when injected into the circulation of rabbits or dogs, causes serious toxic or even fatal results. They conclude that the lungs in the healthy individual produce an extremely energetic poison, a volatile organic alkaloid, which is continually removed by the expired air. It is probably this substance which makes living in closed, non-ventilated rooms so dangerous. The authors think that this poison has something to do with the production of tuberculosis—as a favoring condition, apparently. In their first communication they stated that animals injected with tuberculous virus remained uninjured when allowed to go into the open air, but when confined in close apartments soon became tuberculous and died. Dastré and Loye, in a report to the same society, give an account of similar experiments made by themselves, the results of which are not in harmony with those of Brown-Séguard and d'Arsonval. Their experiments were of two kinds. In the first, a dog was made to respire directly the expired air from another dog for a space of seven hours without any injurious effects. In the second, the expired air was condensed and the liquid resulting was injected into the blood of frogs, rabbits, etc., but without any of the evil results described by the other observers.

#### DIGESTION.

The most important paper published during the year upon digestion is that by Heidenhain.<sup>246</sup> The paper is long, full of interesting observations and experiments, and treats both of the histology and physiology of the small intestine. The points of greatest interest in the histological part are the following: The epithelial cells lining the villi have no limiting membrane; in fact, the cells are connected directly with one another by protoplasmic bridges, which are especially marked at the lower or basal end of the cells. The striated borders of the cells are composed of processes of the cell body united by structureless cement material,

and these processes are capable of changing their form. When the living cell is violently stimulated by treatment with a strong solution of  $\text{MgSO}_4$ , or osmic acid, the processes are thrown out into thin, hair-like prolongations, and the portion of the cell attached to them is constricted off. He is fully convinced, in opposition to a former view held by him, that the epithelial cells end abruptly on the basal side and do not unite with any of the elements making up the stroma of the villus. He gives a minute description of the elements making up the parenchyma of the villus, and especially the various kinds of leucocytes found there, with their peculiarities of staining, etc. With reference to the physiology of absorption in the small intestine he divides the process into three parts: (a) the passage through the epithelial layer into the villus; (b) the passage from the villus into the lymph or blood-vessel; (c) the change of the material somewhere in the villus. The three processes will differ naturally for fat and for water (and dissolved substances). Water, he finds, passes through the epithelium by inter- and intra-epithelial paths. How much of the water absorbed passes into the blood-vessels directly and how much into the lymphatics has not been known. Heidenhain gives experiments to show that under normal conditions most, if not all, of the water gets at once into the blood-capillaries, which lie rather close beneath the epithelium. A fistula of the thoracic duct was made and the rate of flow of the lymph determined. The lower end of the ileum was then bound, a cannula introduced, and warm salt solution (0.3 per cent.) was injected into the intestine, two hundred cubic centimetres at a time. The rate of flow of the lymph from the thoracic duct was again determined, and knowing the quantity of water absorbed it was easy to calculate what part of it had passed by way of the lacteals. He found that fully eight or twelve times as much water had been absorbed into the blood-vessels as in the lymphatics of the villi. Inasmuch as in the experiment the quantity of water to be absorbed was abnormally large, it is probable that with smaller quantities practically all would have passed into the capillaries. From calculations based upon his own experiments as well as those of Rohmann, Heidenhain concludes that the passage of water into the epithelial layer takes place with a velocity of about seven micro-millimetres a minute, or 0.11 micro-millimetres a second. If we suppose that the velocity



of the flow is the same through the thickness of the epithelial cell, then the water will require about five minutes to traverse the epithelial layer. One generally thinks of the absorption of water in the small intestine as being faster than this; but Heidenhain's results agree with the experiments made by Lehmann, in which KI was injected into the intestine and then at intervals tested for in the blood. Though the absorption through the epithelium is so slow, Heidenhain finds that it is much quicker than in dead membranes, and this, in his opinion, means that absorption in the living animal is not simply a physical process, but dependent in some way upon the participation of the living epithelial cells; in some as yet unknown manner these cells seem to take an active part in absorption. The lymph collected by the central lacteal of the villus arises, as in other organs, from the exuded plasma of the blood. The driving power of the lymph circulation in the villi lies partly in this steady accession from behind, and partly in the widening of the lacteal whenever the villus is made to contract by the action of its muscles. The driving force is certainly quite strong, as the pressure in the thoracic duct, measured by a mercury manometer, amounted to twenty-eight millimetres, and probably was much greater on the other side of the lymphatic glands. With reference to the absorption of albumens Heidenhain again calls attention to the strange fact, that although we know that the albumens are changed to peptones, nevertheless, no peptones can be discovered either in the blood or in the lacteal liquid. By means of a simple calculation he shows the improbability of Hofmeister's view, that the peptone as it is absorbed is taken into the body of the leucocytes, which change the peptone again to albumen, and, after multiplying by division, pass into the central lacteal, so that the peptone is eventually received into the lymphatics in the shape of albumen. His calculation shows that the number of leucocytes could not possibly be great enough to account for the absorption of all of the peptones in this way. He believes himself that the peptone is taken into the epithelial cells, there, in all probability, changed to one of the blood-albumens, and then passed on to be absorbed directly into the capillaries of the villus. In the substance of the villi peculiar large cells were found filled with coarse granules which stained readily. These cells were present in much larger numbers after a meal, though the kind of food seemed to

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have no direct influence upon them, except that with a very rich flesh diet they become fewer. The appearance of these cells seemed to have some connection with the condition of activity of the mucous membrane, though what they mean and the nature of the granules contained in them remained undetermined. Perhaps the most interesting part of Heidenhain's paper is that bearing upon the absorption of fat. As is well known, a number of different theories have been advanced to explain the mechanism of fat absorption.

One of the oldest, proposed by Heidenhain himself and pretty generally accepted by physiologists, held that the fat passed into the epithelial cells and thence through a system of communicating connective-tissue corpuscles to the central lacteal. Zawarykin maintained that the fat is taken up by leucocytes, which push out between the epithelial cells to the free surface, ingest the fat-droplets, and when loaded down migrate backward toward and into the lacteal, where they break up. Schaefer holds essentially the same view. In the present paper Heidenhain discusses the whole subject in his usual careful and thoughtful way. He emphasizes, in the first place, the fact that blackening by osmic acid is not a certain test for fat. Thus, the granules in the cells described above, which stain so readily, are also colored black by osmic acid, and yet are evidently not fat because they are not dissolved by alcohol, ether, etc. Moreover, he is certain, from a comparison of his with Zawarykin's figures, that these are the very cells which the latter has described as wandering leucocytes filled with fat-droplets. His own theory differs entirely from that originally proposed by him. He believes that fat-droplets pass, without doubt, into and through the epithelial cells. When leucocytes are found with fat-drops within them it is evidently only a secondary phenomenon. After passing through the epithelial cells the fat gets into the pericellular lymph-spaces in the stroma of the villus, and is carried along with the lymph-stroma originating there into the lacteal. The very fine emulsion of the fat found in the lacteals does not occur in the lumen of the intestine nor during the passage of the fat through the villus, but only after it has gotten into the central lacteal itself.

Pohl<sup>273</sup> gives an account of experiments which tend to confirm to a certain extent Hofmeister's view that the leucocytes take a

direct part in the absorption of peptones from the intestine. The improbability or impossibility that all the peptone is passed into the blood by this method seems to have been clearly shown by Heidenhain in the paper just presented. By counting the number of the corpuscles before and after eating, Pohl finds that in carnivorous animals, at least, there is a distinct increase in the number of white corpuscles in the blood after the digestion of albuminous food. Carbohydrates, fats, salts, and water do not have the same effect, the increase following only upon the eating of albuminous substances. The first hour after eating the increase in leucocytes begins to be perceptible, and reaches a maximum at about the third hour. The percentage of increase is found to vary from 35 to 146.7. As to the origin of the new corpuscles, the author convinces himself that they arise in the tissue of the intestinal wall, probably, therefore, in the parenchyma of the villi, and pass at once into the veins. This last idea that the new leucocytes migrate at once into the veins is novel, and the author attempts to justify it by the statement that during digestion there is a marked and constant difference between the number of white corpuscles in the mesenteric arteries and veins, the difference being in favor of the latter. A conclusion of this sort, however, must be received with caution when we remember the results of the work of Cohnstein and Zuntz upon the enumeration of the blood-corpuscles given in the review of this year under the head of blood. These latter call particular attention to the fact that any hinderance to the circulation in the veins, such as might be caused by the operation necessary to obtain a specimen of blood, will result in an increase in the number of the white corpuscles at that point. Pohl advances a theory to explain the value or significance of the increase in leucocytes at the time of digestion. His theory naturally goes considerably beyond the facts he is able to present. He believes that the digested albumens (peptones) furnish the material for the growth of new leucocytes. These new leucocytes enter at once into the veins, so that the absorbed albuminous food is carried into the circulation in the form of organized living matter. In the circulation, finally, the leucocytes break up and serve to replace the albumens of the blood which have been used to nourish the tissues.

Steinhaus,<sup>182</sup><sub>p.211</sub> from a histological study of the goblet cells in the intestine of the "*salamandra masculosa*," comes to the conclusion

that the mucin is formed directly in and from the nucleus of the epithelial cells. The mucous degeneration begins in the middle of the nucleus, and spreads until the whole nucleus becomes very much enlarged and projects from the cell, as seen in the ordinary goblet cell. The formation of the mucus directly in the nucleus itself is, of course, an important theoretical discovery if it can be corroborated; it certainly seems to fit in well with the modern conception of the function of the nucleus in the life of the cell. Steinhäus arrived at his conclusion from the use of differential staining. The nucleus of the ordinary intestinal epithelial cells stains with hæmatoxylin; the nucleus of the goblet cell, on the other hand, takes an orange-red color from the combined action of the hæmatoxylin and safranin. He had no difficulty in finding all intermediate stages of staining between these two extremes, and used this fact to trace the genesis of the mucus within the nucleus.

Dastre<sup>3</sup><sub>Dec. 21, '97</sub> reports two ingenious experiments made upon dogs, the object of which was to determine the part taken by the bile in the digestion and absorption of fats. It was shown long ago that the bile alone does not seem to be sufficient for the emulsification and absorption of fat, for in rabbits the pancreatic duct opens into the intestine some distance (thirty-five centimetres) beyond the opening of the bile-duct. In this interval the food comes into contact with the bile alone, and in this part of the intestine it is evident that no absorption of fat takes place, since the lacteals remain transparent. Just beyond the opening of the pancreatic duct, however, the lacteals during digestion become conspicuous because of the emulsified fat contained in them. Dastre has succeeded in making a complementary experiment upon dogs. A cholecysto-intestinal fistula was established in two dogs, so that the bile-duct came to open into the intestine fully a metre beyond the pancreatic duct. The dogs survived the operation, appeared perfectly healthy, and after several months were killed while in full digestion. It was found that throughout that portion of the intestine where the food was in contact with the pancreatic juice alone no absorption of fat had taken place, since the lacteals were transparent. But beyond the new opening of the bile-duct, where the food was mixed with both pancreatic juice and bile, the lacteals were filled with emulsified fat. The author takes the experiment as proving that both bile and pancreatic juice are necessary for the digestion of fat.

Digestion of fat, however, includes two separate processes—the emulsification within the intestine and the absorption into the villus. From experiments made outside of the body it seems that pancreatic juice alone is capable of emulsifying fat as completely, probably, as it occurs within the lumen of the intestine. The very fine emulsion found in the lacteals is not formed, as shown by Heidenhain's work, quoted above, until the fat gets into the lacteal itself. Dastre's experiment, then, would seem to prove only that the bile is necessary in some way to the absorption of fat. This fact has been demonstrated before by experiments of another kind: for instance, those of Röhmnn and of Voit, in which a biliary fistula was made so as to carry the bile away from the intestine altogether. The result was that a large percentage of the fat escaped absorption and passed out of the body in the fæces.

A second contribution to the physiological action of bile is made by Limbourg.<sup>83</sup> v. 12, p. 196 The point that he endeavors to determine is, whether or not the bile has an antiseptic action upon pancreatic putrefaction in the small intestine. His method of approaching the question is novel, and depends upon the fact that in pancreatic putrefaction three sorts of substances, excluding bodies like indol, skatol, etc., are formed, namely, peptones or propeptones, amido acids like leucin, and free ammonia. These three substances mark successive stages in the progress of the putrefaction, so that by chemical analysis one is able to state to what extent the putrefaction has advanced. Limbourg used artificial digestion, making two parallel experiments in each case, using bile acid in one digestive mixture and omitting it from the other. After a certain time both specimens were examined chemically to determine how far the putrefaction had gone. He found in all cases that in the specimen containing the bile acids putrefaction was less marked, and concludes, therefore, that bile has an antiseptic influence upon this process. In an interesting general discussion by Kossel<sup>84</sup> Aug. 20 of the physiological action of the bile, based upon this work of Limbourg's, he points out that bile or the bile acids cannot be considered as preventing the growth of putrefactive bacteria, since bile itself undergoes putrefaction. The antiseptic influence of the bile, then, must be confined to a regulating action upon the course of chemical changes taking place during the pancreatic putrefaction, preventing or tending to prevent the breaking

down of the useful peptones into the less valuable, because less nutritive, amido compounds. Kossel seems to think, also, that the part played by bile in the absorption of fats may possibly be explained from this stand-point. Granting that bile is necessary to the absorption of fat, the usual explanation has been that the bile, by moistening the epithelial surface, makes contact with the fat possible, or, at least, has some such direct action. He suggests that possibly the action of the bile is indirect, preventing by its antiseptic action the formation of injurious substances which would retard the absorption of fat; so that after the withdrawal of the bile by means of a fistula the failure of the intestines to absorb the fat depends upon the abnormal course of the putrefactive fermentation going on within it.

The most generally employed test for bile in serum and other liquids is the Pettenkofer reaction for the bile acids, consisting in the formation of a beautiful purple color, when the bile acids are mixed with sulphuric acid and some cane-sugar. Mylius<sup>83</sup> has shown recently that this reaction depends upon the fact that the strong sulphuric acid acts upon the cane-sugar and forms furfurol  $C_6H_4O_2$ , and it is the furfurol which unites with the bile acids to give the color reaction. Instead of the ordinary method of applying the test, Mylius found that furfurol water with sulphuric acid is a safer and a much more delicate method of detecting bile acids. Udranszky<sup>83</sup> finds that furfurol gives color reactions with a number of other substances, and in some cases the color is the same as that caused by bile acids. But the color resulting from the reaction with bile acids has a definite spectrum, so that in a doubtful case this test can be relied upon to furnish decisive proof whether or not the substance examined is bile acid. Udranszky makes use of the pure furfurol water to determine whether normal urine contains any trace of bile, but finds that it does not, although other substances in it produce a somewhat similar color with the furfurol.

Zaleski<sup>273</sup> reports a series of experiments which show that the liver has the function of separating or excreting iron from the body. Two rabbits were taken from the same litter and protected carefully from any contact with iron. Four days before the final experiment they were starved, and then 0.0096 gramme of iron, as ferric sodic tartrate, was injected into the jugular vein of one of

them. Three hours after the injection both animals were killed by bleeding, and the vascular system was thoroughly washed out by means of a 25 per cent. solution of cane-sugar. The organs, completely freed from blood, were then examined quantitatively for iron—the analyses on the rabbit which had not received an injection of iron were used, of course, to control the experiment. In the rabbit in which iron had been injected it was found that the quantity of iron in the different organs was increased above the normal only in the liver, indicating that this organ alone was concerned in the excretion of the iron from the body.

#### SECRETION AND NUTRITION.

Langley's fourth contribution,<sup>178</sup> to the physiology of secretion is taken up by a consideration of the effect of atropin upon the different hypothetical varieties of secretory fibres contained in the nerves supplying the salivary glands. Heidenhain's nomenclature, as added to by Langley, makes three physiological varieties of gland nerve-fibres—secretory fibres, controlling the formation of water and salts; trophic, causing (according to Langley) an increase in the solubility of the stored-up secretion material in the gland-cells; and anabolic fibres, causing the formation of fresh material in the gland-cells from the foods furnished by the blood. All three kinds of fibres are supposed to be present in the chorda tympani nerve supplying the submaxillary gland. Atropin is known to inhibit or paralyze the action of the secretory fibres, preventing any obvious flow of secretion (water), and Langley attempts to discover whether it affects similarly the other two sorts of fibres. From his experiments, made upon cats and dogs, he concludes that atropin paralyzes completely the action of the chorda upon the submaxillary gland, so that from the study of the phenomena of atropin poisoning alone no evidence can be obtained in this particular case which will support the theory of three varieties of secretory fibres.

Bradford,<sup>178</sup> gives a number of interesting experiments upon the nerves of the salivary gland bearing chiefly upon the question of the paralytic secretion of the gland after section of its nerves. He finds, in common with other observers, that after section of the chorda tympani (cat) a paralytic secretion sets in, the chorda fibres degenerate down to the gland, and the gland itself undergoes some

atrophy. The rapidity of degeneration in the chorda fibres under these circumstances differs in dogs and cats, being much slower in the latter, probably because more of its nerve-fibres make connection with the cells of the submaxillary ganglion. Section of the cervical sympathetic, on the contrary, is not followed by a paralytic secretion nor by an atrophy of the submaxillary or the parotid glands. The degeneration of the secretory fibres in the sympathetic after this operation proceeds only as far as the superior cervical ganglion, since even six weeks after the section stimulation of the nerve-branches going from the ganglion to the gland will cause a secretion. After removal of the superior cervical ganglion itself the sympathetic secretory fibres degenerate quickly as far, at least, as the gland, but there is no atrophy of the gland nor paralytic secretion. A parallel series of experiments upon the parotid gave similar results. Destruction of the tympanic plexus in the dog is followed by an atrophy of the parotid, while section of the sympathetic fibres has no such effect. The important conclusion to be derived from these experiments is that atrophy of the salivary glands follows only upon section of the cerebral nerve-fibres received by them. Hence, Bradford also suggests that in addition to the secretory and trophic nerve-fibres assumed to exist in Heidenhain's theory of secretion there is a third set of anabolic fibres which reach the glands only through the cerebral nerve-branches. The impulses carried to the gland-cells through these fibres cause a construction (anabolism) of cell substance, as opposed to the destructive or catabolic changes brought about by the action of the secretory and trophic fibres. On the strength of this hypothesis Bradford proposes a new theory of paralytic secretion. Given in his own words, the theory reads as follows: "In secretory glands, such as the salivary glands, there is an intrinsic mechanism, thanks to which the gland protoplasm is able to manifest its special function, *i.e.*, secretion. This mechanism is connected to the central nervous system by two sets of nerve-fibres, the anabolic and the catabolic; the former are only present in the cerebral nerves, the latter in both. The anabolic fibres tend to inhibit the activity of this local centre, the catabolic to increase it." When the anabolic (cerebral) fibres, therefore, are cut the check on this local centre is removed and the continuous paralytic secretion begins.



Novi<sup>182</sup><sub>p. 208</sub> gives a number of analyses of the chlorine, or NaCl, contained in the secretion of the salivary gland under different conditions, and compares them with the amounts of the same substance in the serum of the blood. He finds that the NaCl of the saliva is never equal to that in the serum. When the secretion of saliva by the submaxillary was increased by reflex stimulation of the mucous membrane of the mouth the quantity of NaCl in it increased with the amount of secretion, though not proportionally. The NaCl in the saliva increased also with the amount of NaCl in the serum up to a certain point. When the amount of NaCl in the serum was augmented artificially by the injection of NaCl into the blood, the quantity of NaCl in the saliva also became greater until the chlorine contents of the serum amounted to 0.7 per cent., at which point the secretion of saliva stopped completely and could not be aroused by strong reflex stimulation.

Munk and Senator<sup>20</sup><sub>M. 114, H. 1</sub> have succeeded in experimenting upon kidneys kept alive and functional by an artificial supply of blood. They were able under these circumstances to vary the arterial pressure at will, and found that when the blood pressure was increased by one-third to one-half of its former height the amount of urine secreted also increased from four-fold to twenty-three-fold. This increase was not dependent upon the greater blood pressure simply, but upon the stronger velocity of the blood-flow through the kidney. Along with the greater volume of secretion accompanying the rise of arterial pressure there was a slight increase in the amount of NaCl and a distinct increase in the secretion of urea. When means were taken to produce venous congestion by narrowing the venous outflow the quantity of urine secreted was markedly diminished, and here again the volume of the secretion was seen to run parallel to the velocity; that is, the quantity of blood passing through the kidney and not merely to the arterial pressure. At the same time the percentage amount of urea was diminished by one-sixth to one-fourth, while the percentage of NaCl remained practically unchanged. From this it must be concluded that the conditions under which the NaCl is eliminated are different from those governing the secretion of urea. The explanation probably lies in the fact that the NaCl is in large part simply a transudatory product, while the urea is formed by a true secretory action of the cells lining the tubules. The research

forms one of a number published within the last few years which tend to overthrow the physical theory of urine secretion advocated by Ludwig, and to support more or less completely the theory of Bowman as modified by Heidenhain. The authors sum up their views upon urine secretion as follows: Water and a part of the salts of the urine are separated from the blood by transudation through the glomerulus, the amount of transudation depending less upon the blood pressure than upon the velocity of the flow. The specific elements of the urine, urea, etc., together with a part of the salts, are eliminated by the secretory activity of the epithelial cells lining the uriniferous tubules. The specific secretory cells are first aroused into action when the contents of the blood in urea-yielding substances reaches a certain limit, and the degree of their activity is controlled by the velocity of the blood-flow and the quantity of water in the blood. The quantity of the secretion, in fact, is known to rise and fall with the last two factors. Diuretics, like potassium nitrate, salt, caffeine, stimulate the secretory epithelial cells to greater activity, but have no direct effect upon the transudatory products of the secretion eliminated through the glomerulus.

Udranszky,<sup>83</sup><sub>v.12,p.277</sub> has found that furfural gives color reactions with xyloidin and  $\alpha$  naphthol which are exceedingly delicate. The author makes use of these reactions to determine whether there is any carbohydrate material normally present in the urine. Furfural is known to be formed by the action of sulphuric acid on the carbohydrates, so that by adding sulphuric acid and  $\alpha$  naphthol to the urine, if any, even a minute quantity of carbohydrate is present the color reaction should show it. His experiments indicated, and the result seems to have been accepted, that a certain minute quantity of carbohydrate is invariably found in normal urine. It remains to be determined what is the particular form of carbohydrate found. The author suggests a quick and easy method of using these color reactions to determine whether or not urine is diabetic. Urine is considered diabetic usually when it contains more than 0.5 per cent. sugar. The two color reactions given above can easily be graduated so as to show whether any given urine contains 0.5 per cent. sugar or more in the following way: 1. Dilute the urine four-fold with water. One drop of the diluted urine is then heated in a test-tube with one cubic centimetre of sulphuric

acid, and in the mouth of the tube a paper strip moistened with xylidin acetate is held. If the vapor causes this to turn red it proves the presence of sugar in the urine to an amount exceeding 0.5 per cent. 2. Dilute the urine with water ten-fold. One drop of the diluted urine is then placed in a test-tube with two drops of a 15 per cent. alcoholic solution of  $\alpha$  naphthol. Let half a cubic centimetre of sulphuric acid flow down the side of the tube under the mixture; if at the surface of contact there appear a violet ring over a green band it shows the presence of sugar to an amount equal to or exceeding 0.5 per cent.

In a series of careful experiments made upon himself Keller,<sup>83</sup><sub>v.12,p.128</sub> has attempted to determine the effect of ethyl alcohol upon the body metabolisms. He kept himself for several days upon a known diet and then during four days, living upon the same diet, he took in addition one hundred and fifty cubic centimetres of 96 per cent. alcohol mixed with his water. Analyses of the urine made throughout these two periods of the experiment showed that the alcohol acted as a diuretic, and that in consequence of this, most probably, there was a slight increase in the amount of chlorine secreted as NaCl during the alcohol days. During this last period, also, there was a slight diminution of the N excretion (urea), though he thinks that this might be explained as an indirect effect of the disturbing effect of the alcohol upon the digestion and absorption of food. He was not able to prove any distinct change in the secretion of phosphoric acid in consequence of the use of the alcohol. His results seem to show that alcohol in the quantities used has no perceptible effect upon the body metabolisms.

Albertoni,<sup>400</sup><sub>v.9, No.2, Oct.10</sub><sup>126</sup> in experiments made upon the fats of alcohol and its first oxidation product, aldehyde, when taken into the body, finds that alcohol in a normal, healthy organism is destroyed almost entirely, but aldehyde, as a product of its oxidation in the body, is only met with exceptionally. When aldehyde is introduced directly into the organism it is eliminated unchanged chiefly by way of the lungs and kidneys. That a body so easily oxidized as aldehyde should pass through the body unchanged seems to be somewhat remarkable.

Rosenthal,<sup>182</sup><sub>v.1</sub> making use of the vaporizing calorimeter of J. Rosenthal, has endeavored to determine the effect of various conditions upon heat production and dissipation in healthy and febrile

individuals. Instead of introducing the entire body into the calorimeter, only the arms, one or both, were experimented upon, and the results derived from them were considered applicable to the whole organism. His most interesting results were obtained from fever patients. In high fevers he found always a distinct diminution in the amount of heat lost, and, contrary, perhaps, to the usual opinion, he believes that this is the primary factor in fever. The pyretic agent, whatever it may be, circulating in the blood acts directly upon the vaso-motor centre and either stimulates the vaso-constrictors to greater action or paralyzes the vaso-dilators, the final result being that the vaso-constrictor impulses overbalance the vaso-dilators. The peripheral effect of this upon the blood-vessels will be a diminution in the flow of blood through the skin, and this alone he believes is sufficient to explain the febrile rise of temperature. He is careful to say that an increase in heat production may contribute to this result, but still this must be looked upon as secondary to the diminution in heat loss. The increase in body metabolisms which occurs during fever, and which has been established beyond all doubt by the study of the nitrogen excreta and oxygen consumption at that time, he explains as a secondary result of the rise of temperature brought about by the lessened heat dissipation, instead of considering it, as is usually done, as the primary cause of the rise of temperature. Antipyretics (antifebrine and antipyrine) cause a decided and quick increase in the quantity of heat dissipated, and he explains their effect in breaking fevers entirely upon this ground. The effect of cold baths and direct artificial cooling of the skin he leaves for a future communication. In his experiments upon healthy individuals he finds, among other things, that alcohol, especially in the case of those not accustomed to its use, causes an increase in heat dissipation. Drinking hot water has the same effect, while cold water exerts an opposite influence, which is not, however, well marked. Muscular contractions lead to greater heat dissipation as well as to an increase in heat production.

With reference to the effect of muscular work upon the body metabolisms, it has been conclusively shown that the muscular contractions have no direct effect upon the nitrogenous excreta of the urine, but a very marked and unmistakable influence upon the amount of  $\text{CO}_2$  eliminated from the lungs. The inference is, of



to the recurrent laryngeal. He finds that in stimulating this nerve one may get either closure or dilatation of the glottis according to the strength and the rate of stimulation. Weak currents with slow rates produce dilatation. If the rate is kept constant and the strength of the stimuli alone increased, closure of the glottis is obtained. If, on the contrary, the strength is kept constant and the rate of stimulation increased, closure of the glottis again follows, and, indeed, more easily in this case than in the first.

Bowditch and Warren <sup>99</sup><sub>May 21</sub> have taken up the physiology of the knee-jerk and its reinforcement, and have added a new observation of great interest to our knowledge of this interesting phenomenon. The exact point to which they directed their attention was the effect of varying the time interval between the reinforcing act and the knee-jerk. They give a curve constructed from five hundred and fifty-one normal and six hundred and twenty-four reinforced knee-jerks, the acts of reinforcement occurring at different intervals before the blow upon the patellar ligament was struck. The interesting point which the curve shows is, that as long as the interval between the act of reinforcement and the blow on the ligament did not exceed 0.4", the extent of the knee-jerk was increased. If, however, the interval was greater than this, lying between 0.4" and 1.7", then the effect was to diminish the extent of the knee-jerk, to cause an inhibition instead of a reinforcement of the jerk. With an interval of 1.0" to 1.7" the extent of the knee-jerk returns slowly toward the normal, and at 1.7" reaches the normal, the reinforcing act at this interval of time having no influence at all on the extent of the jerk.

A new fact and one of considerable importance with reference to nerve-ganglion cells has been discovered by Hodge. <sup>203</sup><sub>Jan 27</sub> He finds that, like gland-cells, they show distinct histological changes after prolonged stimulation. The ganglion used was the posterior root ganglion, and fifteen experiments were made upon frogs and one, the last, experiment upon a cat. In consequence of the discovery of Nelson, made by counting cross-sections, that in the frog there are two nerve-cells in each posterior root ganglion to one nerve-fibre of the posterior root, Hodge examined a number of preparations, using a fine jet of water instead of the needles to tease the ganglion. He got the following results: 1. Typical bipolar cells do occur, two having been found. 2. The axis cylinder of the

process is often seen to divide and enter the cell as a straight and a spiral fibre. 3. At the angles of the T the axis cylinder of the cell-process may be seen to divide and pass both ways in the nerve-fibre, of which it seldom forms the whole of the axis cylinder. 4. Two cells, in a number of cases, were found to unite their processes, not necessarily as a cell-junction, but to aid in making up the axis cylinder of the same nerve-fibre. Among the stimulation experiments the most fruitful was that made on the cat. No anæsthetic was used, the optic thalami having been punctured instead. The right brachial plexus was exposed in the axilla and stimulated for seven hours, one minute of stimulation alternating with one minute of rest. The general results obtained are summarized by Hodge in this way: 1. The nucleus and cell-body both decrease in size as a result of stimulation. 2. The protoplasm of the cell becomes vacuolated as a result of stimulation. 3. Differences appear in the way in which the stimulated and non-stimulated cells stain.

Lovett<sup>178</sup><sub>v. 2, p. 30</sub> has succeeded in demonstrating that in strychnine poisoning the spinal cord has the power of separating out the strychnine from the circulation and storing it in its own substance. His method of work was to poison the frog with strychnine and then take out equal weights of the spinal cord, liver, muscle, etc. Each portion was ground with water in a mortar to a very fine powder, and this mixture was injected into the lymph-sac of a new frog. The spinal-cord mixture contained the most strychnine, bringing on convulsions in its frog before the others. From an indirect calculation he concluded that in each gramme of spinal cord there was 1.52 milligrammes of strychnine, while one gramme of liver contained 0.325 milligramme and one gramme of muscle 0.337 milligramme of strychnine. The author points out that the experiments have a medico-legal bearing, inasmuch as in cases of strychnine poisoning, where the stomach contents are not obtainable, the spinal cord is evidently the best tissue to choose in testing for the drug.

In his sixth communication upon the physiology of the cerebrum Goltz<sup>246</sup><sub>v. 4, p. 619</sub> continues to describe observations made upon dogs from which a large portion of the cerebral hemispheres had been removed. The outcome of this, as of his other work, is against the now generally accepted theory of localized areas in the cortex of the cerebrum for the performance of its various motor and sensory

functions. He describes a remarkable experiment in which, practically, the entire left cerebral hemisphere had been removed, including the corpus striatum and optic thalamus. Nevertheless, this animal had complete voluntary control over all his muscles, though he showed a distinct preference for using those of the left side when possible, the use of the muscles on the right side requiring, apparently, a greater effort. So the right side of the body, while not devoid of sensibility, was distinctly less sensitive than the left. The intelligence of the animal was weakened, but not to such an extent as to attract the attention of a casual observer, and in addition his visual sense on the right side showed some disturbance. According to the localization theories the motor and sensory areas on the left side of the cerebrum had been entirely removed, of course, and the animal should have exhibited paralysis and loss of sensibility on the other side of the body. In his comments upon this case Goltz takes occasion to reply to the criticisms of his opponents, who have accused him of abandoning his former position, asserting that while in his first communications he was strong in his statements that no localization at all could be demonstrated in the cerebral hemispheres, yet in his later work he has admitted that there is a certain difference in function between the anterior and posterior lobes of the cerebrum. He affirms that he has made no concessions; that the view of small localized areas in the cerebrum is to-day more absurd to him than ever, though his own work has led him so far as to demonstrate a certain difference of function among the different lobes of the cerebrum, so that he can no longer adhere to the old view of Flourens that the surface of the cerebrum is everywhere functionally equivalent. He describes a number of new experiments upon bilateral lesions of the anterior and posterior lobes of the cerebrum in the dog. His results in general are the same as given in former papers. Lesions of the anterior lobes involving the motor areas were never followed by permanent paralysis, though the movements of the animal in consequence were distinctly more awkward and unskillful. For instance, it was not able to hold a bone with its forefeet while gnawing. Lesions of the posterior lobes were followed by the usual weakening of intellectual powers, though the animal still retained perfect command of its muscles in moving and eating, and was able, moreover, to give its foot upon command,—a per-



formance which the dogs with the anterior lobes removed were never able to learn, no matter how thoroughly they had been taught before the operation. In one particular he corrects a former statement with regard to the effect of removal of the posterior lobes. The operation does not leave uninjured, as he formerly maintained, the tactile sensibility of the body. There is a distinct dulling of the tactile sense following the operation, though not to such a marked extent as after lesion of the anterior lobes.

Schäfer, <sup>1005</sup><sub>v. 48, No. 204</sub> on the other side, gives an account of experiments made upon the occipital lobes and adjacent parts of the monkey's brain which strongly support the localization theories. From electrical stimulation of the cortex of the occipital lobes and adjacent parts (angular gyrus) Schäfer obtained a number of co-ordinated movements of the eyeballs, the movements differing according to the place of stimulation. He divided the whole area experimented upon into three zones—superior, inferior, and intermediate. Stimulation of each of these areas gave certain characteristic movements of the eyeballs, though at the boundary lines of the zones there was naturally not a sharp separation, but a shading off of one sort of movement into the other. Assuming that the movements of the eyeballs were simply the results of subjective visual sensations aroused by the stimulation, Schäfer draws the following conclusions from his experiments: 1. There is a connection of the whole visual area of each hemisphere with the corresponding lateral half of each retina. 2. There is a connection of the superior zone with the superior part of the corresponding lateral half of each retina. 3. A connection of the inferior zone with the inferior part of the corresponding lateral half of each retina. 4. A connection of the intermediate zone with the middle part of the corresponding lateral half of each retina. So that, as Schäfer expresses it, if we were to conceive that the two retinas were projected upon the visual areas of the cortex, the identical points in the two retinas would be superimposed upon the cortex. The portion of the visual area corresponding to the central spot, the area of direct vision, according to this scheme, would fall along the visual surface of the occipital lobes.

We have been accustomed to teach that birds deprived of their cerebral hemispheres can no longer see or make voluntary move-

ments of any kind. Contrary to this general belief Schrader <sup>246</sup><sub>v. 44, p. 11</sub> finds that birds (pigeons) from which the entire cerebral hemispheres are removed are capable of making spontaneous or voluntary movements, can see perfectly well, and can exercise a choice. Most of the birds upon which he performed the operation died, but the few that survived he succeeded in keeping for a long time. The drowsy, stupid condition which comes on immediately after the operation soon passed away, the birds moved around briskly during the day, but fell asleep at the approach of night. When flying or walking they were able to avoid obstacles as easily as the normal animal. If placed upon an unsteady support they would leave it voluntarily to fly to some firmer perch. In one particular they showed a distinct difference from the normal animal, that is, they were not able to feed voluntarily. This loss the author thinks was not owing to lack of intelligence or to any dullness of sensations, but resulted from a motor disturbance following injury to the anterior portion of the cerebrum, as in the experiments of Goltz, given above. Taken in connection with the results of Steiner upon removal of the cerebrum in fishes and the author's former experiments upon frogs, this work upon the pigeon seems to show that, in the lower animals at least, some of the functions that we have been accustomed to attribute to the cerebrum really belong to the deeper or posterior parts of the brain. The pigeon with its cerebrum removed, in addition to its inability to feed voluntarily, showed other differences from the normal animal which indicated a loss of intelligence, or, as Goltz expressed it, a loss of personality. For instance, pleasure, fright, and similar emotions were not aroused, as under normal conditions. The mother showed no interest in her young; the male in the breeding season gave the external signs of sexual desire, but when placed with a female took no notice of her at all, avoided her, in fact, while moving around, as he would any other obstacle. The bird operated upon made neither friends nor enemies of the other pigeons with which it was kept.

It has been an article of common belief among physiologists that the normal nerve stimuli proceeding from the motor centres of the brain and cord are discontinuous, and have a proper and, to a certain extent, a constant rhythm of their own. So when artificial stimuli are applied to the central nervous system the impulses

sent out from the nerve-cells are not, according to general belief, of the same rhythm as the artificial stimulus employed, but follow the peculiar rhythm of the motor nerve-cells. The rhythm for the cells innervating the voluntary muscles was placed at eighteen to twenty a second by Helmholtz, and at ten a second by Horsley and Schäfer in a recent paper. The general belief in this function of motor-cells seems to be well grounded, since it rests upon researches made by Helmholtz, Loew, Kronecker, Stanley Hall, Horsley and Schäfer, etc. Nevertheless, v. Limbeck, <sup>273</sup><sub>Nov. 1</sub> in a new paper, arrives at just the opposite conclusion. From experiments made upon frogs, turtles, pigeons, dogs, and rabbits he has convinced himself, and produces curves to support his theory, that the central nervous system has no rhythm of its own which is capable of prevailing over the rhythm of an external stimulus acting upon it. The stimulus that he used was interrupted induction currents, and he found that direct stimulation of the motor areas of the cerebral cortex, with rates varying from six and a half to thirteen a second, caused tetanic contractions of the muscles of the leg, the rhythm of which varied exactly with that of the stimulus applied to the cortex. With direct stimulation of the spinal cord, using rates varying from five and a half to thirty-four a second, the myograms from the muscles whose contractions were recorded (gastrocnemius in the frog, biceps femoris in the rabbit) showed that a corresponding number of nerve-impulses had been received by the muscle. Finally, reflex stimulation of the cord, with rates varying from four and a half to nineteen and a half a second, gave similar results. So, in frogs poisoned by strychnine, the muscular tetanus did not have a definite rhythm, but a rhythm varying in different animals within quite wide limits, a fact which also tends to support the point he is trying to establish, namely, that the central nervous system does not discharge its motor impulses at a certain definite rate. It will require, of course, further independent corroboration of these results before the present well-established views can be seriously questioned.

Bechterew and Mislawsky <sup>75</sup><sub>Oct. 16</sub> find that quite a large portion of the cortex of the dog's cerebrum may cause, when stimulated, a strong secretion of saliva from the submaxillary gland. The portion of the cortex showing this action most distinctly lies above and anterior to the Sylvian fissure. Even very gentle stimulation

of this area was followed by a secretion from the submaxillary glands of both sides, though the secretion was usually stronger from the gland on the same side. Section of the chorda, of course, prevented the secretion.

The same authors <sup>75</sup><sub>Sept. 15</sub> have discovered that the cortical centre for the bladder lies along the inner side of the sigmoid gyrus and is connected with a lower centre in the anterior portion of the optic thalamus. The centre in the thalamus after destruction of the cortical centre acts as a reflex centre for the bladder, so that stimulation of the central end of the sciatic, even with weak stimuli, causes contraction of the bladder. After destruction of the thalamus much stronger stimulation is necessary to produce the same effect. The efferent fibres from the thalamus centre were traced through the internal capsule and tegmentum to the lower spinal centres.

Vitzin reports <sup>152</sup><sub>Aug. 9</sub> some experiments made upon dogs in which the visual area of the occipital lobe was removed. The animals were kept for two or three months, and he claims, in opposition to Goltz's results and in confirmation of those of Munk and others, that there was complete blindness in the eye of the opposite side.

#### SPECIAL SENSES.

Chauveau contributes a significant experiment upon the movements of the iris. As is well known, it has long been a subject of dispute whether or not dilatation of the pupil is caused by the contraction of radial muscle-fibres in the iris, acting as antagonists to the sphincters, or is simply an elastic recoil after the cessation of the contraction of the sphincter. If the dilatation results from a contraction of the dilator-fibres these must be innervated through the sympathetic, and a reflex act of dilatation ought to take a longer time than a reflex contraction of the iris. His experiments to determine this point were made by alternately throwing light into and cutting it off from the pupil of one eye and observing by an ingenious device the reflex time elapsing before the contraction or dilatation of the pupil of the other eye. He found that the time required was the same in both cases, about one-half second, and argues that this is an indication, at least, that the dilatation of the pupil results from the elastic reaction of the iris after the contraction of the sphincter ceases. The

negative stimulus interrupting the contraction of the sphincter and caused by shutting off the light from the other eye requires just the same time to produce dilatation because it takes the same path as the positive stimulus aroused by light falling upon the retina of that eye.

Isaachsen <sup>246</sup><sub>v. 45, p. 280</sub> gives an account of some experiments carried out for the purpose of testing the correctness of a statement recently made by Holmgren. This physiologist found that if a bundle of homogeneous light-rays of any color except the primary colors, red, green, and violet, was allowed to fall on the retina, and was made so small that its retinal image was smaller than the diameter of a single retinal cone, then the light appeared of different colors when made to fall upon different parts of the retina. If this could be demonstrated satisfactorily it would amount almost to a direct proof of the Young-Helmholtz theory of color vision. Isaachsen's experiments, made with yellow light, completely failed to confirm Holmgren's result; the pencil of yellow rays appeared yellow upon whatever part of the retina it fell.

Goldscheider <sup>320</sup><sub>p. 675, 77</sub> calls attention to the fact that if one dips his hand into CO<sub>2</sub> he feels a distinct sensation of warmth. When the CO<sub>2</sub> comes into contact with larger surfaces, as, for instance, when it is passed under the clothes, the sensation of warmth is proportionally greater. He finds that this phenomenon is partly due to the moisture of the gas and that even with ordinary air one gets a similar result. Moist air at 28° C. appears distinctly warmer than dry air of the same temperature. But CO<sub>2</sub>, even when perfectly dried, gives the same reaction to the skin, though less marked. He is not able to explain this upon any purely physical grounds nor by any action of the gas on the local blood supply, and therefore concludes that CO<sub>2</sub> acts as a direct chemical stimulus to the heat-nerves of the skin.

Two lengthy papers have appeared during the year upon the reaction times of the temperature sensations (Goldscheider <sup>320</sup><sub>p. 484</sub> and Vintschgau and Steinach <sup>246</sup><sub>v. 45, p. 122</sub>). After the discovery of the cold- and heat-nerves of the skin the determination of their reaction times under different conditions followed naturally in comparing them with other sensory nerves. The numbers obtained in the two papers agree quite well, considering that they were made upon different individuals. Among the interesting general facts brought

to light it was discovered that the reaction time for heat sensations is considerably greater than for cold sensations, and that both temperature sensations need a longer time than the pressure sensations. Vintschgau and Steinach observed also that upon the right side of the face the reaction time for the cold- and heat- nerves is shorter than for the corresponding parts on the left side. Striking differences in reaction time were found for the skin in different parts of the body. For example, the reaction time of the cold-nerves varied, as in the following table:—

Face, . . . . .	0.135
Arm, . . . . .	0.162
Forearm, . . . . .	0.152
Abdomen, . . . . .	0.226
Back, . . . . .	0.227

The theory that the semicircular canals act as peripheral sense organs of equilibrium, especially for the head, has been attacked frequently of late. The evident disturbances of equilibrium which follow upon section of one or more of the canals have been explained upon other grounds. For instance, it has been urged that in performing such operations one necessarily injures the cerebellum, which lies close by. Breuer, in a new paper, <sup>246</sup> v. 44, p. 128 gives an account of a series of delicate experiments in which he stimulated mechanically, electrically, and chemically the separate ampullæ, or canals, and with each method of stimulation he obtained movements of the head in the plane of the canal stimulated. It was evident from the method of stimulation, as well as from the constant difference in the effect of stimulating the separate canals, that injury to the cerebellum could not be held responsible for the results of his experiments. The theory which makes the semicircular canals the peripheral sense organs of equilibrium places the reflex centres for the resulting co-ordinated movements in the cerebellum. Under normal conditions the sensory cells in the canals are supposed to be stimulated by the oscillations of the endolymph. The author describes an experiment which would seem to be a direct proof of this portion of the theory. The membranous part of the horizontal canal was laid bare for a short distance and a fine blast of air was directed upon it—first, so as to drive the endolymph toward the ampulla, and, second, so as to drive it away from the ampulla. In each case a movement of the head followed in the direction of the stream of

endolymph. The author believes that in each ampulla certain of the sensory cells are stimulated by movements of the endolymph in one direction and others by movements in the opposite direction. In support of this view he finds that by making use of thermal stimulation he can get movements of the head forward or backward in the same plane, according to the portion of the ampulla stimulated, the inference being that the different directions of the movement are caused by the stimulation of different sensory cells.

## MISCELLANEOUS.

In the ANNUAL of last year the very interesting experiments of Ewald and of Rogowitch upon the physiology of the thyroid bodies were reported. Both observers worked with dogs, both found that extirpation of these bodies proved fatal in all cases, and both concluded that the function of the thyroids is to remove from the body certain as yet unknown products which are injurious to the central nervous system. Sanquirico and Orecchia<sup>285</sup> find that removal of the thyroids from the fox is fatal, just as in the dog, the animal dying quickly with symptoms of tetanic poisoning. But with three young lambs upon which the same operation was performed no evil results followed. The authors remark that the herbivorous animals in general bear the operation without a fatal termination; for instance, the rabbit, horse, goat, calf, cow, and lamb; while in carnivorous animals their excision is quickly followed by death, as shown in the dog, cat, and fox.

Biondi,<sup>4</sup><sub>Nov. 19</sub> has been working upon the same structures, studying both their histology and physiology. A preliminary report of his work is given. He describes the alveoli as completely closed and of a more or less spherical shape, not communicating with each other at all. The alveoli are lined by cylindrical epithelial cells, and the homogeneous contents, the "colloid," cannot be regarded as the result of the breaking down of the cells, but as a true secretion from them. His reason, or one of his reasons, for this view is that he finds some of the same substance as little drops within the bodies of the individual cells. The colloid, or secretion, is of a homogeneous character and stains readily with a number of dyes. By the increase in bulk of this secretion within the alveolus it grows in size. After the alveolus has attained in this way a certain size the epithelial

cells on one side become flatter and finally disappear. At this point the colloidal secretion makes its escape and passes, first, into the surrounding lymph-channels, which are especially numerous and prominent in the thyroid. After the collapse of the alveolus a number of new, small alveoli are formed from its cells which in turn begin the same course of development as in the original alveolus. The most important fact, if it is a fact, which Biondi contributes to our knowledge of these bodies is that their secretion is poured out or pressed out into the lymph-stream. As a proof of this belief he states that the lymph-channels in the middle of the gland are tightly filled with the colloidal secretion found in the alveoli.

Dastre and Pampoukis,<sup>300</sup>  
v. 2, p. 277 give an account of experiments made to determine the effect of swinging or rocking the body upon the respirations and the movements of the abdominal viscera. Their results may be regarded as a contribution to our knowledge of the causation of sea-sickness, and seem to throw some light on that distressing malady. Their experiments were performed upon dogs and rabbits, and among other things they found that when these animals were made to swing rhythmically the thoracic respiratory movements took up the rhythm of the swing. Moreover, there was a distinct want of harmony between the thoracic and abdominal respiratory movements. The abdominal viscera were displaced by the swinging movements and were thrown alternately against the diaphragm and the abdominal walls. The brusqueness of the shock of this movement was moderated to a certain extent by a partial tonic contraction of the diaphragm and by a greater or less voluntary contraction of the muscles of the abdominal wall. It seems quite reasonable to suppose that sea-sickness results from these movements of the abdominal viscera, which in some way, probably by stimulation of sensory nerves (the author suggests by stimulation of the Paccinian bodies of the mesentery), cause the nausea of sea-sickness and the alterations in the respiratory movements recorded above. As a partial corroboration of this view and an explanation of the means by which the unfortunate victim finally acquires his sea-legs it has been noticed (personal communication to the editors of this department) that as the feeling of sea-sickness begins to wear off the abdomen becomes hard and tense from a contraction of its muscles,



the result being, apparently, to prevent or moderate the oscillations of the abdominal contents.

One turns with relief from the marvelous accounts of the action of the magnetic field upon healthy and especially upon hypnotized persons, which have become so prevalent of late, to a scientific examination of the subject made by Hermann.<sup>246</sup> In experiments upon muscle and nerve preparations placed in the magnetic field he could not obtain the slightest evidence of any effect. When the muscle preparation was connected with a galvanometer the magnetic field caused no change in its electromotive properties. So, bringing the head between the poles of the magnet caused no perceptible sensation, while frogs and other animals kept in the magnetic field showed no indication of any effect produced upon them. From his numerous experiments Hermann concludes that a magnet under the most favorable conditions does not have the slightest physiological action upon the animal organism. Hermann is careful to say that in the case of an hypnotic there may be a much more delicate susceptibility to such influences, and in them the magnetic field may produce effects not shown upon a normal person. He made no experiments himself upon hypnotized persons. He criticises, however, severely and justly, some of the extravagant statements made by magnetotherapeutists, and shows the dangers into which medicine must fall when it forsakes the methods of natural science in its investigations and relies upon such metaphysical and illogical experimentation as has been employed in the kind of work under criticism.

A number of observers have shown recently that the substance of cartilage, so-called chondrogen, is not a simple substance but composed of two bodies, one of which is ordinary collagen such as is obtained from connective tissue, the other a substance as yet unknown. Mörner<sup>83</sup> has investigated the subject more closely, by both histological and chemical methods, making use of the tracheal cartilage of the adult ox for special study. In this cartilage he finds, by double-staining of thin sections, that he can easily distinguish two parts, one a series of trabeculæ which arise from the perichondrium and stain like it, and one a homogeneous material containing the cartilage cells and forming rounded masses lying in the net-work of the trabeculæ. If their sections are first

digested with 0.1 to 0.2 per cent. HCL, the acid washed out, and the section then treated with dilute alkali, 0.1 per cent., they show when examined under the microscope nothing but a net-work of trabeculæ; the homogeneous material has been dissolved out. When larger pieces of cartilage are treated in the same way it can be shown that what is left behind is collagen, so that the trabecular net-work must form the collagen found by the chemists, and the masses of homogeneous material in the mesh-work make up the really characteristic substance of cartilage, the properties of which are not yet fully described. It is important to notice that in hyaline cartilages from other places—*e.g.*, from the nose, the joints of the frog, etc.—Mörner did not find the same mixture of net-work and contained substance. He promises a further communication upon the same substance.

Simanowski<sup>246</sup><sub>v. 52, p. 104</sub> gives an account of experiments made upon the laryngeal muscles of the dog. He states that when the anterior crico-thyroid muscle of one side is thrown out of action the vibrations of the vocal cords may alternate instead of being synchronous. In opposition to Exner, he claims that the external branch of the superior laryngeal nerve supplies this muscle with motor fibres, since section of the nerve had the same effect as removal of the muscle. When this nerve is cut on both sides the power of increasing the tension of the vocal cords is wholly lost, as after removal of both muscles, the tone of the animal's voice sinking one and a half octaves.

Klebs<sup>265</sup><sub>No. 52, p. 576</sub> reports a series of experiments which throw some light on the general functions of the nucleus in the cell. By plasmolysis with 16 per cent. cane-sugar he was able in certain algæ to separate the protoplasm from the cell-membrane. The former rolled into a sphere and when kept in the light continued to live, formed a new cell-membrane, and again elongated. In certain favorable cases, with zygnuma, the plasmolysis broke the cell-substance into two halves, one retaining the nucleus, the other becoming entirely non-nucleated. When these pieces were kept in the light the portion containing a nucleus developed a new membrane, chlorophyll corpuscles, etc., and became a normal cell, while the non-nucleated portion, though it remained living for weeks, and undoubtedly respired, nevertheless remained spherical, showing no evidence of growth.

## ANATOMY.

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### OSSEOUS SYSTEM.

*Mechanism of the Human Foot.*—Lane, in the course of an interesting article on this subject, <sup>428</sup><sub>vol. 44</sub>, expressed his opinion that the ordinary description of the calcaneo-scaphoid ligament and its relation to the tendon of the tibialis posticus was inaccurate and incomplete. The tendon of the tibialis posticus passes from the groove behind the inner malleolus on to the inner aspect of the deltoid ligament of the ankle-joint, from which it passes on to a ligament described by Lane as the superior internal calcaneo-astragaloid and thence to the tubercle of the scaphoid. In the active, erect position the tendon of the tibialis posticus does not occupy an inferior relationship to the head of the astragalus, nor does it lie beneath an inferior calcaneo-scaphoid ligament attached to the lower margin of the scaphoid. It lies internal to the head of the astragalus and opposes its movements inward. The superior internal calcaneo-scaphoid ligament is crossed internally by the tendon of the tibialis posticus. This ligament is continuous with the inferior calcaneo-scaphoid and is attached to the inner and back part of the sustentaculum tali, passing forward and upward, from thence to the tubercle of the scaphoid, and outward and forward to the posterior and upper margin of the same bone. This ligament opposes the movement of the head of the astragalus in a direction opposite to that produced in it by the contraction of the tibialis posticus, which is outward. The elongation of the inner margin of the foot during the tread is not due to the yielding of an elastic inferior calcaneo-scaphoid ligament, as is usually described. As to the question of the relative horizontal levels of the tubercles of the os calcis, he remarks: "It is obvious, from the relative thicknesses of the epidermic covering of the heel, that the outer tubercle occupies at least as low a level as the internal in the active erect posture." The action of the tibialis posticus is to press

directly upon the inner aspect of the head of the astragalus, tending to force it outward, and in so doing it shortens the inferior and still stronger superior internal calcaneo-astragaloid ligaments, forcing the head of the astragalus backward and outward. This muscle, by its contraction, also adducts the second row of the tarsus upon the greater process of the os calcis. In the position of adduction the convexities of the several arches of the foot are increased and therefore strengthened in their capacity of transmitting pressure. It is obvious that the position of partial adduction of the foot is that best suited mechanically to transmit great superjacent weight, and we may conclude that it is the one habitually assumed in the active erect posture and that the position of abduction is that assumed in the easy erect attitude. Excessive rotation of the os calcis Mr. Lane believes to be the chief determining factor in the development of flat foot.

*The Bones of the Leg Considered as One Apparatus.*—Dwight, of Boston,<sup>2</sup> gave a graphic description of the intimate relations of the tibia and fibula, the characters of the shafts of those bones, and the axis of the knee- and ankle-joints. He dwelt especially on the fact that the fibula is a bone which cannot possibly be understood when studied away from its connections, even in the sense that the humerus or femur can be fairly comprehensible when examined by the student for the first time. On the other hand, the fibula becomes perfectly simple when the young anatomist takes care to work at a specimen of that bone preserved in connection with the tibia, together with the interosseous membrane. In so doing, he will learn half the anatomy of the ankle-joint at the same time. Many who have begun to work at a solitary fibula in their student days have, in consequence, held hazy notions about that bone throughout their career.

*Formation of the Mediotarsal Joint.*—Stanmore Bishop, in a paper read before the Clinical Society, of Manchester,<sup>2</sup> showed that the prevailing view of this joint amongst orthopædists was that of a transverse articulation passing straight across the foot at the level of the astragalo-scaphoid junction, and including the calcaneo-cuboid joint. The view he upheld was the more strictly anatomical one of a ball and socket, the ball being the head of the astragalus, the socket being formed by the scaphoid, os calcis, and the ligaments connecting them, the calcaneo-cuboid joint being

entirely excluded. He suggested the following arguments as bearing out this idea: (a) the conformation of the bones themselves; (b) the mode in which the various bones were united by ligaments; (c) the method of insertion of muscles into the various bones of the foot, and the especial absence of any muscular attachment to the astragalus; (d) the movements of the various segments of the foot upon one another; (e) the position of the various bones in certain deformities. If this should prove to be correct, a distinct modification of the shoes at present in use would become necessary.

*Angle of the Neck of the Femur at Various Ages.*—Humphry, in a valuable paper on this subject,<sup>6</sup> presented the following conclusions:—

1. The angle formed by the neck of the thigh-bone with the shaft varies considerably in different persons of the same age.

2. It is smaller in short bones than in long bones, and usually small when the pelvis is wide, the combination of these two conditions rendering it usually smaller in men than in women.

3. The angle decreases during the period of growth, before and after birth; but after growth has been completed it does not usually undergo any change, even if life be prolonged to extreme old age, the commonly received opinion on this point being erroneous. Some change may take place in exceptionally rare cases; but, as a rule, the angle remains the same from the adult period till death, at whatever age that event may occur.

4. If during growth the limb be relieved of the weight of the body, as in the bedridden state, in paralysis, or after amputation in the thigh, the angle of the neck with the shaft usually retains the open form of early life, or may, and not unfrequently does, become wider.

*The Hyoid Bone and its Connections.*—Howard, in an interesting demonstration before the Anatomical Section of the British Medical Association,<sup>2</sup> showed that the hyoid bone is the central link of a chain by which alone the objective elevation of the epiglottis can be effected. The upper link of this chain consists of the geniohyoglossi and mylohyoidei muscles; the lower of the hyoepiglottic ligament, this linking the inferior maxilla with the epiglottis. The upward motion of the former produces simultaneous elevation of the latter.

## MUSCULAR SYSTEM.

*Action of the Muscular Fibres of the Œsophageal Opening.*—Gubaroff,<sup>398</sup> had the opportunity, through a case of gastrotomy, of investigating the lower section of the œsophagus, and the action of the muscular fibres of the œsophageal opening through the diaphragm. It was observed that in consequence of the oblique entrance of the œsophagus into the stomach a valvular arrangement is produced. In children, in whom the direction of the gullet to the stomach is straighter, there is a corresponding diminution of the valve, whereby the easier evacuation of the contents of the stomach is provided for. He finds this difference in the direction of the tube still more marked in dry preparations.

*The Vocal Bands and the Hyoepiglottic Muscle.*—Bland Sutton, in an excellent paper on this subject,<sup>6</sup> adduced facts in support of the contention: (1) that the true vocal bands are the result of the tendinous metamorphosis of a portion of the thyroarytenoideus muscle; (2) the false vocal bands, with the cuneiform cartilages of Wrisberg, are the degenerate representatives of a piece of cartilage which originally connected the epiglottis with the cornicula laryngis (Santorini's cartilage); (3) that the hyoepiglottic ligament is the degenerate representative of the hyoepiglottic muscle so largely developed in whales, horses, ant-eaters, many monkeys, and other mammals, sometimes even reappearing in man.

## ARTERIAL SYSTEM.

*Vessels of the Cardiac Valves.*—In an interesting article Darier<sup>410</sup> states that the aortic and pulmonary valves never contain vessels in the normal condition, either in the adult or newborn child. In the auriculo-ventricular valves of the adult there are no vessels in the fibro-clastic membranous portions. As far as the tricuspid valve is concerned, this includes the whole of the flaps. A similar remark applies to the left flap of the mitral valve. The right flap of this orifice has, however, a small upper muscular portion. In the newborn child, whilst more vascular, the large portions of the auriculo-ventricular valves are without vessels.

*Valves in the Veins of the Human Intestines.*—In a comprehensive and well-illustrated paper, Bryant, of Boston,<sup>90</sup> shows that at birth the valves on the intestines are quite numerous in man, and more abundant on the large intestine at that time than later.

In a few months the valves either disappear or become incompetent, with few exceptions. In adult man there are usually a few valves, and these are more abundant in the small intestine, especially in the superficial tributaries of the venæ breves. These valves are more numerous in the jejunum, and disappear as we approach the cæcum.

*Arteries Forming the Circle of Willis.*—Windle,<sup>277</sup> after examining two hundred brains, reported the following results: In one hundred and nineteen the circle was normal. As regards the posterior communicating arteries, it was found that the right was absent in nine instances, the left in thirteen, and both in three. In twenty-eight cases the right was much larger than the left, in fifteen the left than the right. Thus, on the whole, the blood supply on the right side is more complete than the left. A median anterior cerebral artery was observed in nine instances.

#### NERVOUS SYSTEM.

*Probable Course of the Will Tract to the Cranial Nerve Nuclei.*—Several observations having been published tending to show that the fibres controlling the movements of the tongue and possibly of the face do not run within the pyramid, nor in the split-up fasciculi which represent the latter in the pons,<sup>94</sup> Spitzka in a characteristic note<sup>1</sup><sub>Oct. 12</sub> suggests that these controlling fibres should be sought for in the so-called "bundle from the pes to the tegmentum." Not only do pathological observations show that lesion of the transverse and descending fibres of the pons is not necessarily followed by tongue or face paralysis, but in animals in which the extremity tract is absent this aberrant bundle of the pes is well developed. Although in the marine mammalia the crossed and direct pyramid tracts are entirely eliminated and the animals possess no digital movements and have no extremities, their cranial-nerve co-ordinations and functions are, however, very intricate; particularly is this true of the facial and laryngeal innervations, which are wonderfully associated in the blow-hole mechanism.

*Anatomy of the Island of Reil.*—After a careful study of this region, Eberstaller<sup>316</sup><sub>Nov. 24</sub> presents the following conclusions: 1. The insula is not formed so simply as is generally supposed, but falls into an insula anterior and an insula posterior. 2. This separation is produced by a constant fissure. 3. The description of gyri

breves is suitable only for the convolutions of the anterior insula which converge to the pole of the insula; the hinder insula is better described as the gyrus longus insulæ. 4. The basis of the anterior insula corresponds in its whole extent to the frontal lobe; that of the hinder, on the contrary, to the posterior central convolutions. 5. The transverse convolutions on the upper surface of the temporal lobe, passing into the Sylvian fissure in the higher primates and man, are not equivalent to the temporo-parietal gyri of other gyrencephalous mammals, but the gyrus longus insulæ takes their place.

*Comparative Study of the Configuration of the Brain.*—Our corresponding editor, Professor Obersteiner, of Vienna, sends an abstract of a paper by Bendikt,<sup>781</sup> in which this author very properly insists on the advisability of an early effort toward collecting brains of the various races of man as material for comparative brain study. Many primitive races are rapidly dying out, or are losing more and more through intermixture their original character. He hopes that his study of the brain of an Indian published some time ago (which description does not meet with the approval of Professor Obersteiner in every respect) will occasion great excitement among his American colleagues (!), who should also, he thinks, study the admixture of Indian with European and Negro blood.

*Anatomy of the Spinal Membranes.*—Trolard,<sup>25</sup> presents the following conclusions: 1. The membranous sac of the cord does not descend lower than the second sacral vertebra, or rarely the third, being thus placed about eight centimetres from the summit of the sacrum. 2. The sixth pair of sacral nerves never possess ganglia, and the fifth also often want them. 3. The fifth pair of sacral nerves arise from the sides of the terminal cone near its apex, the sixth at the middle part of the sacrum. 4. There is behind and at the sides of the sacrum a true plexus, constituted by the posterior branches of the four first sacral nerves, which, independently of the anastomotic net-work, situated at the level of the posterior sacral foramina, unite at the external border of the sacrum to form a posterior gluteal nerve. Besides this, the two last sacral nerves, united by an anastomotic loop, constitute a small plexus, from which arise posteriorly cutaneous branches, and anteriorly a musculo-cutaneous branch.



*Innervation of the Liver.*—Pal, of Vienna, <sup>22</sup><sub>Apr. 26</sub> performed a series of experiments tending to ascertain whether there existed special hepatic nerves taking their origin along the sympathetic nerve, as believed by many, or whether there existed “vaso-dilators” or “constrictors” for the liver. All the vessels conveying blood to the liver being ligatured and those carrying it off being allowed to remain open, irritation of the splanchnic nerve caused blood to be pressed out by the organ. It thus became evident that the splanchnic nerve exerted a direct influence on the liver, or, in other words, that it contained hepatic nerve-fibres.

*The Phrenic Nerve.*—Wagstaffe <sup>16</sup><sub>Sept.</sub> calls attention to the frequent branch from the phrenic nerve for the supply of the anterior scalenus muscle. He thinks this shows that the scaleni and the diaphragm are intimately associated in their action as respiratory muscles.

*Palmar Nerves.*—In the ANNUAL of 1888 attention was called to a paper by Hartmann, of Paris, in which he described a frequent disposition of the collateral branches of the palmar nerves, consisting of button-hole anastomoses or elliptical loops. At a recent meeting of the Société Anatomique this observer showed drawings which he had just received from Professor Teuchini, of Parma, <sup>1231</sup> who had the year before already described the same condition. The promptness with which priority was thus accorded to Teuchini reflects credit upon the French anatomist.

#### MISCELLANEOUS.

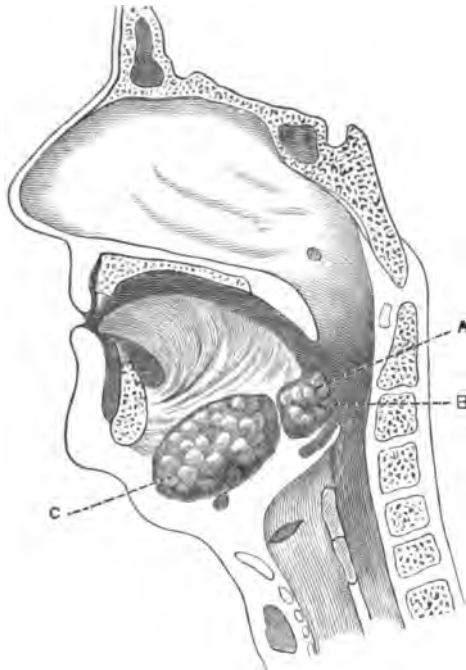
*Structure of the Liver.*—Tabourin, in an important work, <sup>1232</sup> maintains and proves that the real structure of the liver is not that described by the classic authors, but that this organ should be considered as a gland composed of biliary lobules. He has reached this conclusion through pathological anatomy, seeing that it is difficult, not to say impossible, to interpret the various aspects which the lesions of the liver occasionally present, if one takes as a base the ordinary classical schematic description. Investigations pursued according to the various points of view of general anatomy, comparative anatomy, embryology, etc., have confirmed his original idea as regards the *biliary lobule*. The entire work, including two hundred and thirty-three illustrations, is consecrated to the demonstration of this novel theory, which by its real originality entitles its author to great praise.

*Lymphatics of the Brain.*—Rossbach and Sehrwald<sup>54 26</sup>  
Aug. 15; Oct. 1  
 describe three systems of lymphatic channels in the gray substance of the brain: (1) the perivascular and so-called adventitious lymph-spaces; (2) channels subservient to the nutrition of the ganglion-cells; (3) a system subservient to the neuroglia-cells. The authors hold that the perivascular spaces are not of artificial production, but may be detected in living animals and in sections of brain treated with osmic acid. When cervical veins have been ligatured, the lymphatic spaces are observable in the congested brain. These spaces may also be seen in sections that have been hardened by chromic acid and alcohol, through the shrinking of the vessels, wider than in the fresh or unprepared brain. The periganglionic lymph-spaces frequently may be traced around the axis-cylinder of the nerve-processes. The lymph-canals of each ganglion are severally independent of and free from connection with those of other cells.

*Means of Support of the Thyroid Gland.*—Sebileau,<sup>7</sup> in an interesting paper on the capsule and ligaments of the thyroid body, comes to the following conclusions: 1. That there are four cervical aponeuroses—the superficial, the median, the deep, and the transverse, the latter forming part of the median. 2. That the thyroid body has a permanent covering, this covering forming part of the transverse cervical aponeurosis. 3. That this aponeurosis also forms the sheath of the vascular plexus of the neck. 4. That the thyroid body possesses—(a) superior and median ligaments, which form part of the covering, and which, starting from the upper edge of the gland, are attached to both the thyroid and cricoid cartilages; (b) two internal lateral ligaments, which are interwoven with the envelope of the thyroid body where the latter is attached to the trachea; (c) six lateral ligaments, which are lost in the transverse cervical aponeurosis, and which follow the upper, the superior thyroid artery; the median, the middle thyroid vein, and the inferior, the inferior thyroid artery. These ligaments do not have an independent existence, and are really hardly entitled to the name. The actual means of support of the thyroid body is its intimate connection with the trachea.

*Origin of the Foramen Cæcum Linguae.*—A. C. Bernays, of St. Louis,<sup>109</sup>  
Oct. presented an exceedingly interesting study of the foramen cæcum of the tongue, based upon a case of tumor of this

organ, upon which he operated. As shown in the cut, the growth consisted of two parts, the smaller portion, A, presenting at its upper part a depression, B, the foramen cæcum. This tumor projected into the pharyngeal cavity, but was covered by the mucous membrane of the tongue only, the lower half of the mass lying between the muscles of the tongue contiguous to the larger



(*St. Louis Medical and Surgical Journal.*)

growth, c, immediately below, the latter occupying about one-half of the space between the point of the chin and the hyoid bone. Microscopical examination proving the growth to be composed of nearly normal thyroid-gland tissue, Bernays concludes, after reviewing the development of the thyroid gland, that the foramen cæcum is the morphological homologue of the primary point of origin of the thyroid body.



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446. Revue spéciale de l'Antisepsie Médicale et Chirurgicale.
447. Revue d'Anthropologie.
448. Revue Médicale Française et Étrangère.
449. Archives d'Anatomie Pathologique, Charcot.
450. Bulletin de la Société Clinique de Paris.
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479. Comptes-Rendus de l'Académie des Sciences.
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497. Il Morgagni.
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675. Kyoto Medical Journal, Japan.
676. Osaka Medical Journal, Japan.
677. Japanese and Foreign Medical News.
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692. The Hospital.
693. Medical News of Japan.
694. Journal of Public Health.
695. Hospital Gazette.
696. Khirurgichesky Vestnik, St. Petersburg.
697. British Journal of Dermatology.
698. Chemiker Zeitung.
699. Revista Clinica de Barcelona.
700. Revue Mycologique.
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703. Journal des Sociétés Scientifiques de la France et de l'Étranger.
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705. Journal Ophthalmologique du Nord.
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| 715. Bulletin de la Société de Médecine du département de la Sarthe.       | 739. Giornale della Real Accademia di Medicina.                     |
| 716. Los Avisos, Madrid.   | 740. Archiv. für Wissenschaften und praktische Thierheilkunde.      |
| 717. Bulletins et publications de l'Académie des Sciences de Belgique.     | 741. Ephemeris.   |
| 718. Bulletin de l'Institut de Statistique.                                | 742. Apotheker-Zeitung  |
| 719. Western Druggist.   | 743. Het Maandblad voor Apothekers.                                 |
| 720. Revue Internationale de l'Électricité.                                | 744. Pharmaceutical Journal and Transactions.                       |
| 721. Pharmaceutical Journal and Transactions.                              | 745. Zubovratchebnyi Vestnik.                                       |
| 722. Jahresbericht über die Fortschritte der Geburtshilfe und Gynækologie. | 746. Bulletins et Travaux de la Société de Pharmacie de Bordeaux.   |
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| 725. Moniteur d'Ophthalmologie.  | 749. Bulletin de la Société d'anthropologie de Paris.               |
| 726. Vestnik Oftalmologii.   | 750. Brown-Séguard's Archives of Scientific and Practical Medicine. |
| 727. Aerzliche Zeitschrift.  | 751. Bulletin de la Société de Biologie.                            |
| 728. Répertoire universel d'obstétrique et de gynécologie.                 | 752. American Journal of Morphology and Psychiatry.                 |
| 729. Transcaucasian Lying-in Hospital Reports.                             | 753. Deutsche Zeitschrift für praktische Medizin.                   |
| 730. Dutch Review of Medicine.   | 754. Voënnno Sanitarnoië Dëlo, St. Petersburg.                      |
| 731. Wiener Medicinische Jahrbuch.   | 755. Langenbeck's Archiv.   |
| 732. Revista Clinica dell' Università di Napoli.                           | 756. La Revista Balear.*  |
| 733. Annales de Médecine Thermale.   |   |
| 734. Australasian Journal of Pharmacy.                                     |   |
| 735. British Journal of Laryngology.                                       |   |
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| 737. L'Anomalo Gazzettino Antropologico.                                   |   |

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| 1001. Inaugural Dissertation.  | 1010. Flick. The Contagiousness of Phthisis. Philadelphia: Dornan, 1888.  |
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| 1004. La Crémation avec les autres modes de sépulture, Stockholm, 1888.  | 1013. On the Localization of the Lesions of Phthisis: its Relation to Diagnosis and Prognosis. London: J. & A. Churchill, 1888. |
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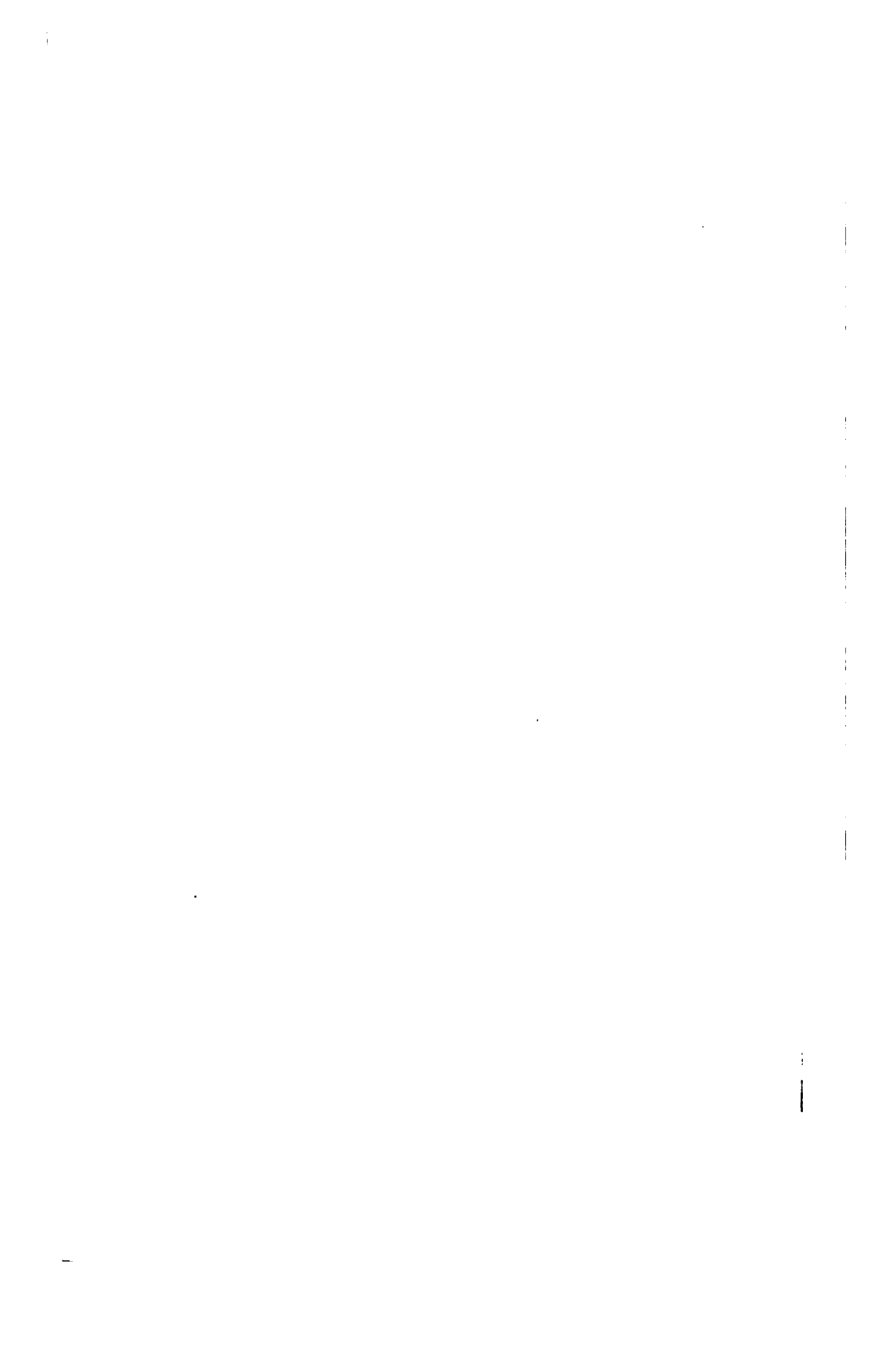


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| <p>1228. Oppenheim. Die Traumatiscbe Neurosen. Berlin, 1889.</p> <p>1229. Fürbringer. Untersuchungen und Vorschriften über die Disinfection der Häute des Arztes nebst Bemerkungen über der bacteriologischen Charakter des Nagelschmutzes. Wiesbaden, 1887.</p> <p>1230. Garretson. Notes on Oral Surgery.</p> <p>1231. Teuchini. Sopra una particolare</p> | <p>disposizione dei nervi palmari nell'uomo. Parma, 1887.</p> <p>1232 Tabourin. Recherches sur l'anatomie Normale et Pathologique de la Glande Biliare de l'Homme. F. Alcan, Paris, 1888.</p> <p>1233. Bréda Anatomy of Lupus of the mucous membranes. Padara, 1888. Eleven pages and three tables.*</p> <p>1234. Electrodiagnostik und Electrotherapie.</p> |
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# GENERAL INDEX.

By C. SUMNER WITHERSTINE, M.S., M.D.,  
PHILADELPHIA.

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\*The dosage represented between [ ] was inserted by the editor of this department, owing to its absence in the general text.

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**THERAPEUSIS.**

**AMBLYOPIA (toxic).**  
*Anipyrin*, gr. 3½ (0.35 grm.)  
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**AMENORRHOEA.**  
Paradism, daily, v. D-31.  
No. 1. B. *Liq. ferri et quin. citr.* § 1 (31.1 grm.), *liq. pot. arsenit.* § 3 (11.65 grm.), *atropina, strychnina*, *liq. gr.* ½ (0.032 grm.), *elir. auranti* q.s. ad § 8 (248.8 grm.).—M. Sig.: § 1 in water, before meals, t. i. d. Ingredients or doses to be increased according to tolerance of patient. To be continued until menstrual malaise appears, then discontinue and give: No. 2. B. *Potass. permang.*, gr. 10 (0.65 grm.). Div. in pil. no. x, compressed or in capsule. Sig.: One pill fol. by one-half glassful of water, before meals, t. i. d. Also, No. 3. B. *Manganesi binoxidi*, gr. 10 (0.65 grm.). Div. in pil. no. x, compressed or in capsule. Sig.: One pill after each meal, t. i. d. If flow is not estab. use No. 1 during the interval, and begin No. 2 three days before expected time, ii. E-45. *Santonine*, gr. x. (0.65 grm.) at night, especially in chlorotic patients; *tinct. lappae major* (sat.), § 1 (4.0 grm.), before eating; *polygonum hydropiperoides* (not. princip.), ii. E-46; *aletris farinosa*, 3d. ext. 20 to 30 drops, v. A-10.

**AMPUTATIONS (multiple).**  
*Ammon. carb.*, gr. 2 to 5 (0.129 to 0.32 grm.), ev. 2 hours or oftener, from time of op. Keep up temp. of pat. during op., iii. E-1.

**SHOULDER.**  
To prevent hemorrhage, Koch's device, iii. E-3.

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(0.0054 grm.) hypod.: *hyocain*  
(*hydrobrum*), gr. 1-140 to 1-  
120 (0.00046 to 0.00054 grm.);  
*potass. iodide* in bronchial  
A. and toxic A.; *arsenic* in  
neurasthenic A.; *amylose*  
*hydr.* in nasal, pharyngeal,  
and bronchial A.; *pyridin*  
in bronchial A. (by inhal.);  
*cocain muriate*, int. and by  
inject., in neurasthenic A.;  
*chloral* in all varieties; in-  
duced current in bronchial  
A. sometimes in toxic A., i.  
A-81; *morphia hyp.*, gr.  $\frac{1}{2}$   
(0.008 grm.); *nitroglycerin*,  
(1 % alc. sol.), 1 drop; inhal.  
of oxygen; and *cocaine* by  
insuff.; *bidens bipinnata*;  
smoky atmospheres; *potass.*  
*iodide* [gr. 2 to 5, t.i.d.], with  
*arsenic* (*Powder's sol.*, 1 to 5  
drops, t. i. d.); rarefied and  
compressed air, i. A-82.

EPILEPTIC.  
*Potass. brom.*, gr. 92 (6.0  
grm.), with *picrolarin*, *soda*  
*bicarb.*, 32 gr. 1-10 (0.006  
grm.), daily, i. A-82.

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If hypertrophies on turbi-  
nated bones, remove or scar-  
ify them, iv. D-28, i. A-82.

ASTIGMATISM, CORNEAL.  
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normal corneal curvature, in  
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THERAPEUSIS.

BRONCHITIS (continued).  
CHRONIC.  
*Naphthalene*, gr.  $\frac{1}{2}$  to 8 (0.1 to 0.5 gm.) in pastilles, one t.i.d.; *terpine*, gr. 3 to 77 (0.20 to 5.0 gm.); t.i.d.; *terpinol*, gr. 15 to 92 (1.0 to 6.0 gm.); t.i.d.; *menthol* inhal., i. A-64; inhal. from respirator (Yeo) of *creosote*, *terebene*, *ruca*, *tyl*, *ol* and *spic. chloroform*, *al*; *ext. grindelii rubund.*, 45 to 60 drops daily; inhal. of eg. pla. *tr. brassia* co., glycerine and alcohol with Bepan's inhaler. Inhal. of warm vapor of *vin. iperic* for 10 min. t.i.d., i. A-65; *curlyptol* *oleum* [M] 10 to 30 (0.6 to 2.0 gm.), v. A-72; *direct. euphorbia pil.*, 3 2 (32.0 gm.), t.i.d., v. A-72.  
PUTRID.  
Inhal. of *ac. carbolic*, *creosote*, *terpentine*; *aq. sol. curros. subli.* (1-9000), 3 v (19.0 gm.), inhaled morn. and evening. Inhal. *iodoform* *powd.*; *thymol* in sleeping-room; *terpinol* [gr. 15 to 72 (1.0 to 4.80 gm.)], and *ol. eucalypti* [M] 20 to 40 (1.28 to 2.56 gm.)] int., i. A-68.  
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DYSPNOEA OF.  
*Nitroglycerine* (1%, *alc. sol.*) M 4 (0.26 gm.), ev. 3 or 4 h., *sol. nutritio* gr. 1 (0.065 gm.) in water, 3 i (3.89 gm.), ev. 3 or 4 h., i. A-64.  
HYDROPS BRONCHIALIS OF.  
Banish steam inhalers. Dry air in room by fire or by vessel containing a few oz. of strong *ac. sulph.*; hot bottles and warm, dry bedding to pat.; hygrometric test, i. A-63; *ac. sulph. dil.* M 5 to 30 (0.3 to 2.0 gm.) int., i. A-64.  
BRONCHOCLE.  
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	Hot compresses <i>sol. ac. carbolic</i> [1-300], until complete suppuration.	
	3d STAGE—FLUCTUATION COMPLETE.	
	Incision (antiseptic), evacuation of pus, extirpation of diseased glands, irrigation with sublimate <i>sol.</i> [1-300]; dressed with <i>iodyform</i> , <i>iodyform gauze</i> , and <i>antiseptic cotton</i> , iii. C-34.	
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	R. Acid. tannic, 31 (4.0 gm.); alcohol, 131 (4.0 gm.); ether, 131 (31.0 gm.)—M. S. Apply several times daily, at first wash with some antisept. <i>sol. (ant. sol. ac. borie)</i> ; open all blisters, and dust with <i>pulv. iodyform</i> before applying the tannin <i>sol.</i> ; cleanse burned area with <i>sol. ac. borie</i> ; dust lightly with <i>iodyform</i> and <i>bismuth subnit.</i> , eq. pts., <i>iodyform gauze</i> over it; cover all with thick layer of absorb. cotton and roller bandage, iv. A-17; cocaine, 1 pt.; lanoline, 25 pts.; mix fresh and apply; <i>myrrh. sulph.</i> (gr. 1/2 (0.015 gm.)), hyp., iv. A-18. ( <i>Carum oil</i> on lint, cov. with thick layer of cotton; warmed bed, hot bottles, stimulants; after shock disappears, irrigation, with <i>sol. ac. borie</i> ; <i>sulphochrylate</i> of sodium applied with C. H. P. to part of surf.; <i>iodyform</i> and <i>bismuth</i> [pts. eq.] to the rest; cover with <i>antisept. gauze</i> saturated with <i>ac. borie</i> , gutta-percha protective, iv. A-18. <i>Sol. ac. carbolic</i> (5% to 10%), <i>sol. bicarb.</i> , q. s. ut. ft. pasta—M. S.: Spread thickly over burned area with knife, cover with layers of absorb. cotton or old muslin sat. in carbolicized water, and bandage; keep dressing wet with carbol. water for 2 days, then use <i>sol. ac. borie</i> , <i>bismuth subnit.</i> ; M. ft. pasta; leave on till healed; if pus forms, remove, cleanse burn, and reapply paste; if dressing becomes dry, moisten with <i>sol. ac. borie</i> , iv. A-19. Skin-grafting, iii. E-35.	
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## THERAPEUTIS.

- CHOLERA ASIATICA (continued).  
grm.); *Sydenham's laudanum*, 30 drops; water, temp.  
100.40 to 104.0 F. (380 to 400  
C.), 0.4 (2 litres) — M., i.  
D-31. Hypodermoclysis; sa-  
line sol. (3% *sul. carb.* and  
4% *sul. chlor.*), temp. 100.40  
to 104.0 F. (380 to 400 C.) into  
subcutan. connect. tissue, i.  
D-32.
- PREMONITORY DIARRHŒA.  
(*cholera*, gr. 5 to 15 (0.32 to 1.0  
grm.), and *castor-oil* [1 or 2  
large spoonfuls] an hour  
later; diarrhœa continuing  
and bowel being empty,  
stimulants and carminatives  
are used, and large quanti-  
ties of *hydrochloric acid*  
lemonade; later, enteroclysis  
102.20 to 104.0 F. (390 to 400  
C.) for 10 to 15 mins., fol.  
by friction and warm bed; diet  
to be regulated, i. D-32.
- 2D STAGE — TYPICAL DIAR-  
RHŒA, VOMITING AND  
CRAMPS.  
Enteroclysis ev. 3 to 4 hrs.,  
3 to 5 litres (quarts) with 31½  
(5.0 grm.) *taurin* in each; if  
not effect, *crotonol* 1 to 5 to 10  
(0.32 to 0.65 grm.); if diar-  
rhœa is bloody, use *erythrin*  
and enteroclysis of *insus-*  
*ipicar.*, 3½ (2.0 grm.) in 2  
pints (1 litre), allowed to  
stand 1 hr. Cramps—Dry  
friction and mustard, with  
turpentine applications if  
severe, ice frictions. Vom-  
iting—Cracked ice, load  
champagne, *potio Riverii*,  
*tinct. indi.* [2 to 10 drops] in a  
little water, i. D-32 and 33.
- APPROACH OF ALGID STAGE.  
*Ether* [M 30 to 60 (2.0 to 4.0  
grm.)] hypod.; *camphor* [gr.  
3 (0.19 grm.)] *alcohol*, 31 (4.0  
grm.) — M. Sig. M 6 to 30  
(0.365 to 2.0 grm.)] hypod.;  
*camphor* [pts. 3.0 *sul. mori.*, pts.  
100 — M., trit. and filter. Sig.  
M 20 to 60 (1.28 to 4.0 grm.)]  
hypod.; *caffine* [gr. 10 (0.64  
grm.)] *alcohol* and water, 33.  
31½ (5.0 grm.) M. Sig.  
M 4 to 18 (0.256 to 1.15 grm.)]  
hypod.; dry friction; mus-  
tard cataplasms; hot bottles;  
hot-air bath, no food, i. D-33.
- ALGID STAGE AND ASPHYXIA.  
Hypodermoclysis, 31½ to 65  
(50.0 to 200.0 grm.), according  
to pulse; injections used: R  
*Sul. chloride*, 51 (4.0 grm.);  
*sul. hyposulphite*, gr. 45  
(3.0 grm.); distilled water,  
0.2 (1 litre); or R *Sul. hypo-*  
*sulphite*, gr. 45 (3.0 grm.);  
*sul. carbonate*, gr. 45 (3.0  
grm.); *sul. chloride*, 51  
(4.0 grm.); distilled water,  
0.2 (1 litre); if hypo-  
dermoclysis failed, perito-  
neoclysis was tried, in  
young pat. 31½ (50.0 grm.),  
if pulse does not appear, up  
to 33½ (100.0 grm.) may be  
used. Ice frictions and ice  
bags to head and spine, in  
beginning blood stasis. Ice  
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Enteroclysis of—*Sul. hypo-*  
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B-70; multiple and daily scarifications of the mucosa, fol. by applic. <i>cupr. sulph.</i> in <i>glycerine</i> 1-8; if necessary precede with touches to temples, iv. B-71; acute stage, irrig. <i>sol. sublimat</i> (1-1000) or <i>sol. boric acid</i> (1-100); subacute, mitigated stick <i>argent. nitr.</i> ev. second day; <i>tannin</i> and <i>glycerine</i> (1%)—If more chronic, <i>crystal of copper sulphate</i> , or <i>sol. cupr. sulph.</i> (1%) to gran., iv. B-73; electro-cautery, pointed electrode, "cremate" each trachoma fol. level with conjunctiv. surface; if growth is dense apply flat electrode; antisept. compress and bandage fol., iv. B-83; <i>jequirity seeds</i> (5% infus. of hulled grains in cold water; use in 6 hrs.), iv. B-160; <i>cryst. ammon. mur.</i> or <i>sol. jequirity</i> (5% infusion cold); pressure to trachoma follicles: <i>R. Quinine</i> , gr. 10 to 20 (0.65 to 1.30 gm.); <i>glycerine</i> , 31 (31.0 gm.)—M. Apply ev. morn., with <i>R. hydrarg. acid. Aze.</i> , gr. 4 to 8 (0.26 to 0.52 gm.); <i>vaseline</i> , 31 (31.0 gm.)—M. Apply ev. evening after enucleation of trachoma bodies: crush trach. fol., wash with <i>sublimat sol.</i> (1-3000); drop into <i>sat. copper sulph.</i> in <i>glycerine</i> (1-16) and use massage, iv. B-73; <i>molasses</i> , a few drops into everted lower lid ev. day, iv. B-74. <b>DIPHTHERITIC.</b> <i>Mucilage of tannin</i> , loc.; <i>lemon-juice</i> ev. 6 hrs., loc.; <i>pin-apple juice</i> , fresh, loc. t. i. d.; <i>sol. pyruvic</i> , loc. t. i. d.; <i>sol. pyruvic</i> , loc. t. i. d., iv. B-130.	<b>CILIARY BODY (continued).</b> Unpigmented Spindle-Cell Sarcoma—Alk. iv. B-7. Accommodation Spasm—Müllerheim, iv. B-87. <b>MUSCLE SPASM FROM PRESSURE ON CAROTIDS</b> —Bull, iv. B-142. <b>CINCHONA, THERAPEUTIC USES</b> —H. H. Rusby, v. A-49. <b>QUININE SALTS</b> —J. W. Mulvey, J. Weaver, A. U. Everts, C. Liégeois, v. A-89; Bins, Forvara, de Bourmann and Viljean, Chasseaud, H. Corson, v. A-50; J. M. Duncan, T. B. 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<i>R. Colloidii</i> , 100 pts.; <i>ac. salicylici</i> , 10 pts.; <i>terebinth. vent.</i> , 1 pt.; <i>chlorophylli</i> , q. s.—M., v. A-133.	
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Saline sol. hypoterm., at first 2½ sol., later 3-5½ sol.; 6 or 8 large Pravaz syringefuls at once and repeated—useful in collapse; cocaine, gr. 1-16 to 1-8 (0.004 to 0.008 grm.); ev. 6 hrs., at 1 year, I. E. 27. morphine, gr. 1-80 to 1-60 (0.0008 to 0.00108 grm.); atropine, gr. 1-300 to 1-150 (0.00022 to 0.00013 grm.). Mix and give hypod., I. E. 29.	
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Tinct. ferri chlor., 3i. (3.88 grm.), daily at 1 yr.; quiet in bed, with full sustaining rest; heart tonics and stim- ulants early, as digitalis, atrophanthus, sparteine, cas- fine, camphor, alcohol, and musk, especially when anti- pyrin and antifebrin are given; digitalis, fld. ext., ℥i 2 to 4 (0.13 to 0.26 grm.); spar- teine sulph., gr. 1-10 (0.065 grm.), 4 times daily at 1 yr.; brandy, 53 to 10 (93.0 to 310.0 grm.), daily; R. caffeine sali- cylate, or benzoate of cas- fine and sodium, gr. 1 to 5 (0.064 to 0.32 grm.); water, ℥i 2 to 10 (0.13 to 0.65 grm.); mix, and give hypod.; R. camphor, gr. 5 to 20 (0.32 to 1.29 grm.), in 5 pts.; almond-oil hyp. in 24 hrs.; strychnine regularly; musk (Siberian), gr. 10 to 15 (0.65 to 0.97 grm.), given in thin mucilage within 3 or 4 hrs., I. J. 20; bichloride of mercury, gr. 1 (0.016 grm.), at 4 mo., in 24 hrs.; at 3 to 5 yrs., double amount for 4 to 8 days or longer; each dose, gr. 1-60 to 1-30 (0.001 to 0.002 grm.), in milk or water (1-6000), I. J. 21; oxycyanide of mercury sol. (1-10,000), 3i (4.0 grm.), ev. ¼ to 1 hr., according to age, V. A. 91.	
TINCT. FERRI CHLOR.	
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 by cold milk; also loc. R  
*finet. ferri chlor.* M77 (5.0 grm.); water, 326 (100.0 grm.)—M. Sig.: Apply to membrane on pledget of cotton, retain for a moment.  
*R. Ferri chloridi*, 32 (8.0 grm.); *glycerini*, 33½ (15.0 grm.); *aquar*, 341 (180.0 grm.)—M. Sig.: ½ to 1 teaspoonful for children, 1 tablespoonful for adults, ev. ½ to 2 hrs., day and night; also, *quinine*, milk, beef-tea, brandy, and an occas. emetic, i. J-22.

**ACID CARBOLIC.**  
*R. Ac. carbol. cryst.*, 3 2½ (10.0 grm.); *camphor*, 31 (30.0 grm.); *alcohol*, 3 2½ (10.0 grm.); *acet. oil*, 3 13 (50.0 grm.)—M. Sig.: Apply with rubbing and firm pressure to diphth. patch, twice daily. Also *sol. acid carbolic* (½). Sig.: Irrigate throat ev. 2 hrs., i. J-23.

**SOL. HYPOSOULPHITE.**  
*R. Sol. hypso sulph.*, 31 (3.88 grm.); water, 32 (62.0 grm.)—M. Sig.: One teaspoonful ev. 2 hrs., under 1 yr. *R. Sol. hypso sulph.*, 31½ (5.82 grm.); water, 32 (62.0 grm.)—M. Sig.: One teaspoonful ev. 2 hrs., older children. *R. Sol. nat. hypso sulph.* (1-8)—Sig.: One teaspoonful ev. 2 hrs., adults; also *ter. ferri chlor.*, i. J-23.

**CHLORAL HYDRATE.**  
*Ipecac* emetic, nausea, food and stimulants, then give *chloral*, gr. 1½ to 5 (0.087 to 0.32 grm.), given as a syrup (early stage), i. J-23.

**CARBOLATE OF SODIUM.**  
 Used locally in sol., i. J-23.

**ACID SALICYLIC.**  
*R. Infus. eucalypti*, 33 (93.3 grm.); *glycerini*, 32½ (9.72 grm.); *ac. salicyl.*, gr. 4½ (0.25 grm.); *aq. laurocerasi*, gr. 15 (0.97 grm.)—M. Apply with brush or swab ev. hr. during day and ev. 2d or 3d hr. at night, i. J-24.

**ANTISEPTIC VAPORS.**  
*Ac. carbolic* and *eucalyptus*; *ac. carbol.* and *ac. salicyl.*; and *ac. benzoic* in alcohol; *tar*, *turpentine*, *eucalyptus*, and *carbolic acid*, i. J-24.

**SILICIC ACID.**  
*Sulphur*, *subl.* or *precip.* blown over facial surf. through a quill tube, or insufflator ev. 2, 4, or 6 hrs. *R. Sulphur (precip.)*, 31½ (5.82 grm.); *chocolate puod.*, 31 (3.88 grm.); *cinnamon-water*, 31 (3.88 grm.); *glycerini*, ad 33 (93.3 grm.)—M. Sig.: ½ to 1 teaspoonful ev. hr., i. J-23.

**TURPENTINE.**  
*R. Ol. terribinth.*, 31 (3.88 grm.); *acet. sps. eth. nitrosi* (7), M4 (0.25 grm.)—M. Give t.i.d., also, *sol. sod. salicylate* (2½), a tablespoonful ev. 2 hrs.; *sol. pot. chlorate (sat.)* as a gargle; generous and stim. diet of strong broths, milk, port wine, i. J-25; applied pure to membrane ev. 3d hr. (no drink for ½ hour after; used with vapor of lime-water and carbolic acid); leeches to neck; *mercurial oint.* to enlarged glands; *calomel int.* at beginning, *quinine* during disease with *sod. benz.* dissolv. in *ether*.

**DISEASES, MORTALITY RATES OF—B. F. Hart, v. F-25.**

**DISLOCATION OF CLAVICLE—Evans, iii. G-9.**  
 OF ELBOW—Peterson, Ollier, iii. G-13.  
 OF HIP—Baker, Thorndike, iii. G-13.  
 OF PATELLA—Roux, Lucas-Championnière, iii. G-15.  
 OF RIBS—Quint, iii. G-9.  
 OF SCAPULOID—Stewart, iii. G-14.  
 OF SEMILUNAR CARTILAGE OF THE KNEE—Croft, Annandale, Davies-Colley, Allingham, iii. G-15.  
 OF SHOULDER—Ory, Lacour, Ewell, Robson, iii. G-10; Le Fort, iii. G-11; Edw. Smith, D. Benjamin, A. M. Sheild, Yeates, Bonygus, iii. G-12.  
 OF THUMB—Guermosprez, Thomas, Bessel-Hagen, iii. G-14.  
 OF UPPER END OF FIBULA—Hirschberg, Leggett, iii. G-16.

**DISTOMUM (Bitharsia)—Virchow, i. F-9;**  
 Bihars, Meckel, Fouquet, Allen, Dight, Harley, i. F-10; Fritsch, R. Koch, Graml, Rovelli, i. Ijima, i. F-11.

**DOCHMIUS DUODENALIS—Leichenstern, Gratien, Lutz, Rockwood, i. F-17;**  
 Machado, Griesinger, Ernst, Rockwood, Porter, i. F-18.

**DRACUNCULUS—A. Saccani, Davaine, Kuchenmeister, M. R. Vinze, i. F-11;** Woskresensky, i. F-15.

**DRAINAGE AND DRAINAGE TUBES—Kocher, Trelat, Championnière, Czernia, Rydygier, Whitehead, Maylard, Javaro, Piskacek, iii. F-8;** Briesky, iii. F-9.

**DROWNING, DEATH BY—Brouardel and Loya, iv. H-15;** Obolonsky, iv. H-16.

**DRUGS, ACTION ON BILIARY SECRETION OF—Prévost and Binet, v. B-36.**

**ON THE HEART OF VARIOUS—Rammo and Ferraunni, v. B-31.**

**CIRCULATORY CHANGES IN THE KIDNEYS UNDER THE INFLUENCE OF—Smirnow, Botkin, Munk, v. B-29.**

**INFLUENCE ON DIGESTION OF—Fowler, v. B-33.**

**RAPIDITY OF ABSORPTION OF—Chouppe, v. B-28.**

**SYNERGIC EFFECTS OF TOXIC—Roger, v. B-32.**

**DUCTUS COMMUNIS CHOLEDOCHUS, IMPERFORATE—J. B. White, v. J-23.**

**VENOSUM SEU ARANTII, ABSENCE OF—R. Paltauf, v. J-23.**

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Dwellings, effects of insulation on (see air, hygiene of).....v. G- 13	<b>DIPHTHERIA (continued).</b> and <i>potass. chlor.</i> in small doses, i. J-26. <b>MERCURY BICHLORIDE.</b> Used in atomizer of sol. strength: under 2 yrs., gr. 5-6 (0.05 grm.); 2 to 6 yrs., gr. 1½ (0.10 grm.); over 6 yrs., gr. 3 (0.20 grm.), added to water, 36 (200.0 grm.)—M., i. J-26. <b>MENTHA PIPERITA.</b> Pure oil applied twice daily, locally, i. J-27. <b>ETCALYPTUS GLOBULUS.</b> Place leaves in vessel of boil. water, under a tent made over pat. bed: "constant blue-gum steam," i. J-27. <b>PILOCARPINE.</b> <i>Pilocarpine</i> and <i>perchloride of iron</i> ; <i>pilocarpine auriate</i> (very dangerous; avoid use), and tracheotomy, i. J-28. <b>CREASOTE.</b> 1. By vaporization: R <i>Creasote</i> , 32½ (10.0 grm.); <i>alcohol</i> , 326 (100.0 grm.); <i>water</i> , 0 2 (1 litre)—M. 2. Application by brush ev. 4 or 5 hrs. R <i>Creasote</i> , 31½ (5.83 grm.); <i>alcohol</i> , 32½ (10.0 grm.); <i>glycerine</i> , 35 (20.0 grm.)—M. 3. Hypodermically, in grave cases. R <i>Creasote</i> , 35 (20.0 grm.); <i>olive-oil (aseptic)</i> , 36 (186 grm.)—M. Sig.: Gr. 1½ to 4½ (0.10 to 0.30 grm.) of <i>creasote</i> , or 11 to 45 (1.0 to 3.0 grm.) of solut. according to age, i. J-29. <b>SODIUM BORATE.</b> Under 1 yr., gr. 7½ to 15 (0.50 to 1.0 grm.); 2 to 5 yrs., gr. 15 to 22½ (1.0 to 1.5 grm.); 5 to 10 yrs., gr. 30 (2.0 grm.); adults, gr. 45 to 75 (3.0 to 5.0 grm.) daily. Given in equal doses ev. hr. when awake, no local treat.: continue after membrane is gone, i. J-29. <b>TANNIN.</b> R <i>Tannin</i> , 10 pts.; <i>mucil. of acacia</i> , 100 pts.; <i>spts. menth. pip.</i> , 2 to 20 pts.—M. Sig.: Apply locally with syringe ev. 2 hrs. into mouth and nares, i. J-30. <b>BROMIDIA.</b> Doses suffic. large to prod. stupor and prevent laryngeal spasm, at first ev. hr., later ev. 2 hrs. to prod. quiet breathing, i. J-30. <b>NASAL.</b> If nares are blocked, use probe wrapped with absorb. cotton, wet with 50% to 90% sol. <i>ac. carbolic</i> ; injection of warm solution <i>sul. chlorid</i> (5% of 1%), <i>ac. boric</i> (sat. sol.). R <i>Sublimat</i> , 1 pt.; <i>sul. chlorid</i> , 35 pts.; <i>water</i> , 5000 pts.—M. <i>Lime-water</i> ; <i>sul. papavotin</i> ; all used with short, stout glass syringe, with soft-rubber tip, or, if child must lie down, from a spoon or Davidson atomizer: used ev. hr. or oftener, a single spray on each side, so that fluid returns through other nostril or mouth or swallowed, i. J-31; <i>sul. ferri chlor.</i> (5% to 10%) ev. 1½ hr., with milk diet, i. J-32; <i>menthol</i> , cotton plugs in nares wet with 20% sol. <i>menthol</i> , i. J-32; <i>boric acid</i> , nasal suppository of <i>ac. boric</i> and <i>co-caine</i> , i. J-32. R <i>Ac. borici</i> , 32 (7.77 grm.); <i>sul. borat.</i> , 32 (7.77 grm.); <i>sul. chlorid</i> , 31 (3.88 grm.); <i>aqur.</i> , 0 1 (500.0 grm.)—M. Sig.: Inject 1 teaspoonful, warm,	<b>DUODENOSTOMY FOR CANCER OF STOMACH</b> —Maydl, iii. B-28. <b>DUODENUM, ULCER OF</b> — Etiology—Maurier, Letulle, i. D-12. Diagnosis—Planchard, Bucquoy, W. Robbin, Tran Svensson and Wallis, F. Eklund, Oslar, i. D-13; Johnston, i. D-14. <b>DUPUYTREN'S CONTRACTION</b> —Rinné, Abbe, Trélat, Dupuytren, ii. B-65. <b>DURA MATER, FUNGUS TUMOR OF</b> —Richet, iv. D-12. <b>DYSMENORRHEA, ELEKTROLYSIS IN</b> —F. E. Bunts, v. D-28; R. D. Blackwood, v. D-31. <b>AND STERILITY</b> — Etiology—McGillieuddy, Coquard, Chéron, Bouliware, ii. E-48. Treatment, Local—Goodell, Madden, Rogers, Goulet, Wathen, Chéron and Reverdin, Poulet and Fraipont, ii. E-49; Fraipont, Hegar, Lee, Fry, Williams, ii. E-50. Treatment, Constitutional—Routh, ii. E-50; Chambers, Devillers, Segur, ii. E-51; Brown, Rivière, Laget, G. Sée, Windelschmidt, Chouppe, Ortigosa, ii. E-52. <b>DYSPEPSIA, ACID TESTS IN</b> —Riegel, Bosa, Günzburg, Arlt and Kuhn, i. C-1; Sée, Günzburg, Faucher, i. C-2; Uffelman, Haas, Würster, Bourgot, Günzburg, i. C-3; Kinnicut, Cahn and von Mering, i. C-4; Günzburg, Hougmann and von Noorden, F. Spaeth, Ewald, i. C-5. <b>CHRONIC, IN CHILDREN</b> — Sterilized Milk in—Penzoldt, Soxhlet, i. E-3. Washing Out the Stomach in—Epstein, Soltmann, i. E-3. Dilatation of the Stomach in—Machon, Demme, Baginsky, i. E-4. <b>SYMPATHETIC OR NERVOUS</b> —Wm. Gull, i. C-15; Leachman, i. C-16. <b>SYMPTOMATOLOGY OF ACID</b> —Reichman, Jaworski, Riegel, i. C-10. <b>TREATMENT OF</b> —Reichman, i. C-14. <b>DIET IN</b> —Dujardin-Beaumets, i. C-14. <b>USES OF MICROCOCCI OF FERMENTATION IN</b> —Rietach, Hirschler, i. C-12. <b>DYSENTERY, ACUTE</b> — ETIOLOGY—Chantemesse and Widal, Cornil, i. D-3; Traubot, Mathis, Bertrand, i. D-4; Bertrand, i. D-5. <b>PARALYSIS IN CHRONIC DIARRHOEA OF WARM COUNTRIES, AND</b> —Pugibet, i. D-5. <b>TREATMENT</b> —Anon., Campbell, Hintzerhof, Surath Lal Boru, Bertrand, i. D-6; J. D. T. Reckett, i. D-7. <b>DYSTOCIA, SHORT FUNIS A CAUSE OF</b> —E. B. Shaw, Schatz, King, Turgard, ii. I-8
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C-5 fistula fissuratum branchialium with defective membrana tympani, iv. C-6 anomaly, iv. C-6 voluntary mutilation of, iv. C-25	DIPHTHERIA ( <i>continued</i> ). into each nostril ev. 2 hrs., the head thrown back, i. J-33. 33. <i>Sublimat. R. Hydrarg.</i> <i>bichlor.</i> , gr. 2 (0.129 grm.); <i>aque.</i> , O 1 (500.0 grm.).—M. Sig.: One teaspoonful (gr. 1-60, 0.001 grm.) to be sprayed or injected into nares, or nares and fauces, for pat. from 2 to 5 yrs.: 2 teaspoon- fuls (gr. 1-30, 0.002 grm.) for pat. from 7 to 12 yrs.: i. J-33; <i>carbolic acid</i> , crude, 3 tea- spoonfuls to a quart (1 litre) of water, in a douche used hourly, v. A-46. OF NEWBORN. <i>Tinct. ferri chlor.</i> , 1 or 2 drops, freq. repeated, interna., with loc. app. of <i>sublimat.</i> <i>sol.</i> (1-1000); also vapor from boiling sol. in room of: <i>R. Acidi carbolic.</i> , 31 (3.89 grm.); <i>ol. eucalypti</i> , 32 (15.56 grm.); <i>spts. terebin-</i> <i>thine</i> , 35 (18.62 grm.). Sig.: Tablespoonful to a quart of water; also wash walls, floors, and furniture of sick- room with strong <i>sublimat.</i> <i>sol.</i> , ii. J-7. DIPHTHERITIC PARALYSIS. Mild cases, good diet and tonics; ordinary cases, gal- vano or faradic current; <i>strychnie</i> , hypoder., at 3 yrs., gr. 1-65 (0.001 grm.) daily; at 5 yrs., gr. 1-31 to 32 (0.002 to 0.003 grm.) daily, i. J-33. OR FAUCES. Paste of black pepper and honey to fauces [ev. 4 to 6 hrs.], i. J-34. OR LIMBS AND TRUNK. Envelop limb twice daily in a pack of infusion of <i>cap-</i> <i>sicum</i> (1-125); interna., <i>tinct.</i> <i>phosphori</i> , one teaspoonful, i. d.; galvanism, i. J-34. OR HEART. Keep quiet in bed, head low; hypod. of brandy; <i>ammo-</i> <i>nia</i> , <i>camphor</i> , <i>musk</i> , and electricity, useful; predi- gested beef prep., peptonized milk, concentrated foods; if pat. rallies keep in bed, i. J-34; absolute rest, i. J-35; Ling's system of movements, i. J-35. DOCHMIDUS DUODENALIS. <i>Thymol</i> , 32½ to 3 (10.0 to 12.0 grm.), i. F-18. DRACUNCULUS. ANAKPATTEE.—1 dos. fresh leaves, bruise in a mortar and add a little <i>chunan</i> ; apply to the diseased part, cover with some whole leaves, bandage, and keep at rest, i. F-15. DUPUYTREN'S CONTRACTION. Trelat's op., ii. B-65. DYSENTERY, ACUTE. Large enemata of hot or ice- cold water. <i>R. Gum.</i> , 3½ to 1 (1.94 to 3.88 grm.); water, O 2 to 3 (1 to 1½ litres).—M. Given once daily, through soft-rubber tube, introduced one ft. into bowel: <i>R. salin.</i> , gr. 10 (0.65 grm.); ice-water, O 1 (½ litre).—M. Sig.: As <i>eucma</i> ev. 2 to 6 hrs.; <i>R. naph-</i> <i>thalin.</i> , gr. 8 (0.52 grm.); dis- tilled water, 33 (93 grm.).—M. Sig.: As <i>eucma</i> , repeated if required. <i>R. Ext. sporec.</i> <i>Ad.</i> , gr. 30 to 50; water, 32 to 3 (8.0 to 12.0 grm.).—M. Sig.: Ev. 6, 12, or 24 hrs.; add <i>lou-</i> <i>danum</i> , if not retained; <i>tinct. aronite</i> , M 1 (0.065 grm.). Sig.: Give ev. ¼ hr. for 8 or 10 hrs., then ev. hr.;	EAR, DISEASES OF— GENERAL DIAGNOSIS— Weber's Experiment—Gellé, Weber, iv. C-7. The Tuning-Fork—O. D. Pomeroy, iv. C-7. In the Negro—T. E. Murrell, L. Turn- bull, iv. C-8. Differential Diagnosis of Periph- eric and Central Disease—D. B. St. John Roosa, iv. C-8; F. Massei, Jacano, Wamba, Urbantschitsch, Fechner, Ma- sini, iv. C-9. Electrical Reactions of the Acoustic Nerves—Gradenigo, F. Massei, iv. C-10. PHYSIOLOGY, EMBRYOLOGY, AND ANOM- ALIES—Ossicles—Toynbee, Kessel, Schwartz, Berthold, iv. C-1; Kessel, Toynbee, iv. C-2. Membrana Tympani—S. O. Richey, Gegenbauer, iv. C-2. Limits of Hearing—J. K. Love, iv. C-3; Preyer, Galton, Weber, iv. C-4. Color Hearing—Baratoux, iv. C-4. Sacous Endolymphatics—Rüdiger, Hause, Schwabe, Hause and Retzius, iv. C-5. Fistula Fissuratum Branchialium with Defective Membrana Tympani—Ole Bull, iv. C-6. Anomaly—Wagenhauser, iv. C-6. VOLUNTARY MUTILATION—Justin Karl masky, iv. C-52. ECBOLICS—J. W. Hyde, G. 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THERAPEUSIS.

DYSENTERY (continued).  
*sol. Hydrarg. bichloride*  
[1-10 (grm.)] O. 2. Sig.: Use  
as an irrigating enema, after  
washing out rectum with  
water as hot as can be borne;  
follow with suppos. opii., gr.  
1; *solut* [gr. 10 to 15 (0.65 to  
1.0 grm.)] ov. 2 hrs., fol. by  
a draught of water; i. D-6.

BERTRAND'S TREATMENT.  
MILD CASES.

*Purg. of muina* [31 to 2 (31.0  
to 62.0 grm.) in milk] or *solut*  
*sulphate* [31 to 2 (4.0 to 8.0  
grm.)], given on morn. of 1st  
day, and in evng., rectal in-  
ject. of *ac. borie* in warm  
water [1 to 30]; next day and  
afterward, give by enema,  
*sperac.* gr. 15 to 30 (1.0 to 2.0  
grm.), in infusion, or *solut*,  
*argent. nitr.* [1-384]; when  
stools improve, give by enema  
*ex. rhatany fl.* [3½ to 1  
(2.0 to 4.0 grm.)].

MED. CASES.  
*Muina* or *solut. sulph.*, as be-  
fore, until stools are diar-  
rheal, with opiate at night  
for sleep; in bloody dis-  
charges, give *sperac.* [gr.  
15 to 30 (1.0 to 2.0 grm.)] by  
mouth for 3 or 4 days; later  
give *muina* in milk, as be-  
fore, then give *bismuth* [gr. 5 to 15  
(0.32 to 1.0 grm.)] or *ex. rha-*  
*tany fl.* [3½ to 1 (2.0 to 4.0  
grm.)] by enema till cured.

SEVEREST CASES.  
Same as in last forms if it is  
borne, with injections of *solut*,  
*argent. nitr.* [(1-384)] and hot  
hip-baths, i. D-6.

FEEBLE PATIENTS.  
Purgatives in smaller doses,  
with inject. of *arg. nit. sol.*,  
and claret and water, i. D-7.

DYSENTERY, CHRONIC.  
*B. Argent. nitr.* 31 (4.0  
grm.); distilled water  
(warm), O 3 (1½ litres)—  
M. Sig.: Give as enema  
with long rubber tube and  
funnel, using all. Retain 5  
minutes, and repeat daily  
till better, i. D-7. *Nota, ext.*,  
5½ to 1 (2.0 to 4.0 grm.), 2  
or 3 times daily, v. A-37;  
*myrobatan*, v. A-110.

DYSMENORRHOEA AND STERIL-  
ITY.

General faradization as a  
tonic; electrolysis, 40 to 60  
milliamperes, v. D-28; electro-  
lysis, 75 to 150 milliam-  
peres, v. D-31; *cocculus in-*  
*diens*, fd. ext., 3 drops ev. 4  
hrs., beginning 3 days bef.  
period and contin. through  
it, v. A-60.

LOCAL TREATMENT.  
Careful dilatation to extent  
of 1 in. or 1½ inches, using  
antiseptic precaution, and  
use of intrauterine pencil of  
10 gr. of *iodatum*, ii. E-48;  
if endometritis, use curette;  
if marked flexion, use short  
intrauterine stem; dilatation  
during hot-water irrigation,  
ii. E-19; tents (laminaria)  
from an *iodatum* and *ether*  
(*solut. ad.*); dilatation by elec-  
trolysis, weak current (4 to 6  
*bichromate* cells); galvanic  
current mild, from supra-  
pubic reg. to sacrum, twice a  
week for sev. weeks, ii. E-50.

CONSTITUTIONAL TREATMENT.

SPASMODIC.  
*Nitroglycerine* [1½ *al.*,  
*solut.*, 1 to 5 drops]; *amyl. ni-*  
*trite* [1 to 5 drops (inhala.)],  
ii. E-51.

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*Sol. bicarb.* [gr. 10 to 60 (0.64 to 4.0 grm.)], or *lit. salicylate* [gr. 7½ to 30 (0.5 to 2.0 grm.)]; *rhubarb* is contra-indicated. Give *sulphur sublim.*; *magnes. calcar.*, 5 gr. (0.32 grm.); *sol. Rochelle*, gr. 20 (1.3 grm.). Mix and give t.i.d. bef. meals. For appetite: *pyric acid*, gr. 0.4 (0.025 grm.); water, O 2 (1 litre).—Mix. Give claret-glassful bef. meals. For nausea: Imperial Mixture, with a small dose [gr. 10 (0.64 grm.)] of *potass. bromide*, ii. E-23.  
IN HERPETIC.  
*Sol. arseniate* [gr. 1-16 to ½ (0.004 to 0.004 grm.)]. Keep bowels regular. If plethora, with profuse menstruation. *R. Ather*, gr. 7½ (0.5 grm.); *potass. nitrate*, gr. 1½ (0.1 grm.). Mix and take t.i.d. before meals, ii. E-23.  
FOR NERVOUS SYMPTOMS.  
*R. Tinct. valerian.* 3i (3.8 grm.); *spts. mellissae* 3i½ (5.84 grm.); *aq. menth. pip.*, 35 (13.4 grm.); *styr. etheris*, 3i (15.55 grm.); *aq. destillat.*, 3i (14.68 grm.).—Mix. Give 3 to 4 tablespoonfuls during the day. Spinal treatment by revulsives to lumbo-sacral regions, ii. E-23.  
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THERAPEUTICS.

ENDOMETRITIS (continued).  
FOR HÆMORRHAGE.  
H. Sol. phosphate, sol. sulphate, 3 1/2 (5.83 grm.): distilled water, 34 (124.4 grm.). M. Give 51 to 1 1/2 (3.89 to 5.83 grm.) hypod. into buttock or thigh twice a week, ii. E-23. Rest in bed; regulated diet; residence at some thermal station. If dyspepsia, Vichy; if obesity, Marienbad or Kissingen; if scurfula, Kreuznach; if herpes, Aix-la-Chapelle, Mont d'Or, St. Etienne; if anemia or chlorosis, Spa, Schwalbach, Pyrmont. Locally, *ungt. hydragry.* irritants, revulsives, or Priestnitz compress over abdomen; uterine massage; hot vag. douches; curette or caustic, in some cases; intra-uterine cauterization with zinc chloride, twice weekly; *ergot*, hot-water douches; *glycerine* tampon, ii. E-24; electrolysis as a caustic; curette with strict antiseptics (contra-indicated by paraperitricitis); ii. E-25; *Ecceurillonage*, dip brush in *sublimat. sol.* (1-1000), then into "antiseptic glycerule;" *cremode*, *iodoform*, *turpentine*, equal parts; *glycerine*, enough to make of syrupy consistence. *Asepticize* vagina, dilate uterus, introduce brush with spiral movement to fundus and remove. *Grattage* (scraping) effects obtained by using stiffer brush; after grattage irrigate uterine cav. with hot weak antisept. sol. and apply vag. tampon of *iodoformized glycerine*. Rest, quiet, and antiseptics are after details, ii. E-26. *Iodoformized* wicking as uterine plug and drainage; *iodoform* gauze packing for uterus. Remove in 24 hrs., irrigate, and repack, ii. E-27.  
PURULENT FORM.  
Prolonged, hot, intrauterine douches, using double catheter, cervix dilated; 6 to 8 qts. (6 to 8 litres) of plain or medicated water 100° to 110° F. (37.8° to 43.3° C.), ii. E-27.  
ENTERITIS, MEMBRANOUS.  
Diet, regimen, hygiene, exercise, fresh air.  
PAIN.  
*Opium* [gr. 1 to 2 (0.06 to 0.12 grm.)], hot fomentations.  
STOMACH COMPLICATIONS.  
*Lavage* with either acid or alk. sol. (tepid) ev. 2 days, i. D-8.  
ENURESIS.  
If preputial adhesion, break them up; if smegma present, remove it; if deep urethral abnormalities, dilate the urethra, i. G-41; electricity; counter-irritate to the back of the neck, high up, as dry cups, scarifications or blisters. *Ext. rhuis armat.* [M 5 (0.32 grm.) at 2 years; M 10 (0.64 grm.) at 2 to 6 yrs.; M 15 (1.0 grm.) for older children. To be given in sweetened water], i. G-42.  
EPIDERMOSIS OF THE FACE.  
Continued current to spine: *potass. bromide* [gr. 30 to 120 (2.0 to 8.0 grm.) daily]; *potass. iodide* [gr. 15 to 60 (1.0 to 4.0 grm.) daily], iv. A-51.

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## THERAPEUTICS.

**EPIDIDYMITIS.**  
 Paquelin cautery; touch lightly the surf. of skin over testicle with white-hot cautery point; dress with ungt. *iodoformi* and suspensory bandage; *sol. argent. nitrat.* (1:8) [sometimes produces sloughing]; *sol. argent. nitrat.* (1:16) [safer] applied on skin over testicle, iii. C-28.  
**EPILEPSY IN GENERAL.**  
*Antipyrin*, gr. 40 to 60 (2.59 to 4.0 grm.), daily; *ac. hypogaeic*, gr. 1-12 (0.005), in pill, 2 to 3 times daily, ii. A-101; cold douche (1 or 2 daily,  $\frac{1}{2}$  to 1 min.) with systematic *bromides* treat. with mixed *bromides*; galvanization over motor gyri, with *bromides*, gr. 75 (5.0 grm.), daily; cathode in one hand and anode applied labile-stable over central gyri and vicinity; electrode, 18 x 25 millimetres ( $\frac{3}{4}$  x 1 in.), sq.; current, 4 to 8 mill. A.; 7 wks. to 10 mos. (daily), ii. A-102; *picric acid*, gr. 1-60 (0.00108 grm.); 4 times daily, v. A-60.  
**POST-HEMIPLEGIC.**  
 Actual cautery applied in streaks over the motor centres, not to produce suppuration, ii. A-100. *R. (vampur monochrome)*, gr. 37 $\frac{1}{2}$  (2.4 grm.); *ext. belladon.*, gr. 6 (0.39 grm.); *ext. gentian*, q. s.; div. in 12 pills, one t.i.d., ii. A-100. v. A-43; *tinct. simulo* (fruit of *Cypripis coriaria*),  $\frac{1}{2}$  to 2 teaspoonfuls (2.0 to 8.0 grm.), t.i.d., v. A-136, ii. A-100; transverse galvanization of thyroid gland, current of 1 to 5 milliamperes; large electrodes (4 in. sq.), ii. A-100.  
**COMA OF.**  
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**WITH INSANITY.**  
*Borax*, gr. 15 to 30 (1.0 to 2.0 grm.), t.i.d.; *bromides*; *chloral*, ii. A-101.  
**JACKSONIAN.**  
 Trephine and excision of the thumb centre, iii. A-69; blisters, just above seat of the aura; constricting bracelets, during attack, iii. A-101.  
**REFLEX OCULAR NEUROSI**  
 (WITH HYPERMETROPIA AND INSUFFICIENT EXTERNAL RECTI).  
 Exercise with prisms and proper convex glasses, iv. B-61; ii. A-103.  
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**REFLEX NASAL OR FACIAL NEUROSI.**  
 Remove primary cause, as rhinolith, hypertrophies, adenoid tissue, etc., iv. D-29.  
**EPISTAXIS.**  
 Large fly-blister over the liver, i. C-41; antipyrin, in powder, in solution, incorporated into gauze or in ointment, insufflated and covered with wadding, etc.; for operations in sol. (5%). Hot-water irrigation; *turpentine* internally [115 to 30 (0.30 to 2.0 grm.)]; *turpentine* and oil [25 p. sq.], and applied with tampon; immerse

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### THERAPEUSIS.

EPISTAXIS (*continued*).  
hands in hot water; blisters over the liver; apply vinegar dilute as injection; case of thin tin, shaped, wrapped with cotton, used as tampon; injections of lime- or lemon-juice after syringing to remove clots; cold douche over hepatic region; oil origanum, 5 drops in emulsion, t.i.d.; cracked-ice tamponing and ice compresses over the nose, iv. D-15.  
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<i>Sol. hydrarg. biniodide</i> (1-200); apply with douche or atomiser to the nose.	
"BIGG'S TREATMENT."	
THROAT.	
<i>R. Sol. coenini</i> (1:20), <i>sol. ur. carbolic</i> (1:120), <i>aa. pta. eq.</i> —M. Spray palate and throat before and after exposure to pollen.	
Nose—Soak two pieces of sponge in same sol. and insert lightly into nostril.	
EYES— <i>Sol. sublimite</i> (1:1000) and <i>sol. sulph. zinc</i> (1:240) for bathing eyes.	
Tonic— <i>R. Lig. pul. arsenicæ</i> , 5 drops; <i>potass. iodidi</i> , gr. 2 (0.13 grm.); <i>spts. ammon. arom.</i> , 20 drops; <i>aqur.</i> , 3i (30.0 grm.)—M. Take thrice daily, iv. D-35.	
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<i>R. Cocaine oleate</i> , gr. 6 1-5 to 15 (0.4 to 1.0 grm.); <i>lanolin</i> , 5i½ (18.0 grm.); <i>olive oil</i> , 3i½ (2.0 grm.)—M. Sig.: Apply locally, v. A-57.	
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## THERAPEUTIS.

- INSOMNIA (SEE INSANITY).**  
*Sulphonal*, gr. 15 to 45 (1 to 3  
 grm.), v. A-154; given in a  
 bowl of hot soup or beef-tea,  
 betw. 7 and 8 p.m., v. A-157;  
*amyl hydrate*, gr. 30 to 45 (2  
 to 3 grm.); or, *Hyamyl hydrat.*,  
 51½ (6.0 grm.); *morph.*  
*mur.*, gr. ½ (0.016); *ag.*  
*destil.*, 325 (97 grm.); *ext.*  
*glycyrrhiz.*, 32½ (10 grm.)  
 —M. Sig.: Halfon retiring.  
*R Amyl hydrat.*, gr. 60 (4.0  
 grm.); *morph. mur.*, gr. ½  
 (0.016 grm.); *aquea*, 312½  
 (49 grm.); *mucil. acac.*, 35  
 (20 grm.) —M. Sig.: To be  
 given by rectum, v. A-16;  
*bolita*, 31½ to 2½ (5.0 to  
 10.0 grm.), v. A-39; *chloral*,  
 gr. 15 (1.0 grm.), v. A-48;  
*Paraldehyde*, *R Paralde-*  
*hyde*, 32 (7.77 grm.); *glyc-*  
*erine*, 34 (15.5 grm.); *syrr.*  
*simp.*, 58 (31.1 grm.); *spts.*  
*ext.*, nigr., 510 (38.57); of  
*anisii*, 20 drops —M., v. A-116.

- INTESTINES, FOREIGN BODIES,  
 IRON NAIL.**  
*Ac. hydrochlor.* [dil. 20 to 60  
 drops well diluted] to form  
 sol. salt of iron, i. D-14.

## OBSTRUCTION, ACUTE.

- Medical Treatment—Rec-  
 tal injection.** Replace-  
 ment with a repositoir,  
 combined with anaesthe-  
 sia, massage of tumor,  
 and inversion of body;  
 limited to first 3 days.

- Surgical Treatment—Lap-  
 arotomy**, iii. B-38; gal-  
 vanism, salt-water in-  
 jection into rectum into  
 which sound (protected)  
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	32 (7.78 grm.); <i>liq. potass.</i>	PATHOGENESIS—Sticker, iv. J-11; Sticker,
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LICHEN RUBER.  
INTERNALLY.  
*Arsenic* in rapidly in-  
creasing doses: "*Asiatic  
pill*," *Hyac. arsenicus*, 2 pts.;  
powd. blk. pepper, 15 pts.;  
*sugar of milk*, 75 pts.—M.  
LOCALLY.  
*R. Hydrarg. bichlor.*, gr. 2 to  
16 (0.13 to 1.04 grm.); *acidi  
carbolici*, gr. 2 to 20 (0.13 to  
1.3 grm.); *ungt. diachyli* (He-  
bra), 3 i (31.1 grm.)—M.  
Begin with smallest dose of  
*bichloride* and increase care-  
fully. *R. Ac. salicyl.*, 2 pts.;  
*resorcin*, 7 pts.; *ungt. diachyli*,  
90 pts.—M. Use  
during day, and preced-  
ing ointment during night,  
iv. A-42. *R. Fowler's sol.*,  
gtt. 1; *sq. distill.*, gtt. 15—  
M.; hypod. (The *Fowler's sol.*  
should be oiled, and the  
wound should be closed by  
*collodium*.) If well borne,  
dose may be increased grad-  
ually to six drops (max.),  
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WITH DEGENERATION OF  
PERIPHERAL NERVES.  
*Salicylates* and *salicylic acid*  
the most important, espe-  
cially in early stages and  
rheumatic forms; *arsipyrin*,  
*potass. iod.* and *brom.* and  
*colchicum* also of value; later  
stages, electricity, ii. B-9;  
*acetanilide*, gr. 5 (0.32 grm.),  
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- LUMBAGO.  
*Erythrophlein*, gr. 1-30 to  
1-7 (0.0021 to 0.0095 grm.),  
hypod., iii. O-13; *salol*, gr.  
4 to 8 (0.26 to 0.52 grm.) daily,  
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GANGRENE.  
Incision and free drainage,  
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## THERAPEUSIS.

- MEASLES (continued).
- BRONCHO-PULMONARY SYMPT. *Influs. ipocac.*, *tinct. aconite*, and *symp. sod. iodid.* diminishes expector. and dyspnea; *sod. brom.* and *sod. iod.* when cough is persistent, i. I-15.
- COUGH.  
Cold water and ice; *bromides*, *chloral*, and *decod. tr. opii* in syrup, i. I-15
- HEART AND LUNG COMPLICATIONS.  
Dry cups, twice daily: *R. pulv. Doveri., pulv. erillae*,  $\text{R}\ddot{\text{R}}$  gr. 2½ (0.15 grm.).—M. Take t.i.d. *Alcohol* in tonic doses; sinapiams to lower limbs; *caffeine*, hyp. inject. [gr. ½ to ¾ (0.008 to 0.032 grm.)], i. I-15.
- PARALYSIS FOLLOWING.  
IF SPINAL CONGESTION ONLY.  
*Ergot*, *strychnis*, and galvanic current to the spine, fol. by cold douche; faradic current used at same time to stimulate paralyzed muscles, followed by dry friction, sulphur- and sea-baths, i. I-16
- IF SYMPTOMS CONTINUE.  
*Potass. iod.* in small doses; heat or thermo-cautery to spine; *calomel* in small doses, and laxatives, i. I-16.
- DIFFICULT RESPIRATION OR HEART-FAILURE.  
Injection of ether; artificial respiration; wet cup to nape of neck. If retention of urine, use catheter, i. I-16.
- MENORRHAGIA AND METRORRHAGIA WITH SUBINVOLUTION.  
*Ert. hydrastis can. Ad.*, 15 to 20 drops t.i.d.; *hydrastis murale*, gr. 1-10 to 1 (0.0065 to 0.065 grm.), three or four times daily, i. E-46; curette and intrauterine tampon, i. E-47.
- AT CLIMACTERIC.  
*Strophanthus sem.*, gr. 3-5 (0.054 grm.), freshly powdered, in pill; first day 2 pills, 2d day 3 pills, and 4 after that if necessary; *ert. hydrastis* and *hamamelis Ad.*,  $\text{er. pts}$  [¾ to 1 (2.0 to 4.0 grm.)], i. E-47.
- RELAXED ANÆMIC.  
*Tinct. tiger-lily blossoms*, 10 drops t.i.d.; decoct. *shepherd's purse*; decoct. of root of *Crataegus offic.*; *ert. ergot Ad.*, and *ert. gonopyris*,  $\text{ss. pts. ssq.}$ , 31;  $\text{er. 2}$  to 3 h. teaspoonful, i. E-47.
- IDIOPATHIC AND SYMPTOMATIC.  
*B. Bryonia dioica rad.*, 35 (19.4 grm.); *riai albi*, O2 (1 litre)—Macerate 8 days and filter. Dose, 34  $\text{er. hour}$ . Unripe oranges, boiled in skins, and well sweetened, i. E-47.

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Antipyrin, gr. 3 to 4 (0.20 to 0.26 grm.), every hour; cyst- in ( <i>Cystus laburnum seed</i> ), gr. 1.20 to 1.12 (.0032 to 0.0064 grm.), hypod., except in spastic M.; nitroglycerine 1% alc. sol., 1 or 2 drops on the tongue, ev. 4 to 6 hrs. (when pallor of face is pres- ent), ii. B-44; <i>sod. chloride</i> , a tablespoonful followed by draught of water, ii. B-45.	
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**THERAPEUSIS.**

**SURGICAL DRESSINGS IN GENERAL (continued).**  
"Muskeg moss" soaked in sol. *sublimato* (1-200), deep sutures with catgut, skin suture with silk, iodoformized collod. on surf., *bala. Perus.* as dressing and hemostatic, *turpentine loc., tinct. lobelia loc., crude petroleum loc., ac. salicyl. loc.,* sterilized sponge, stearate of lime, iii. P-10; *photaxylon* as substitute for collodion; when plaster-of-Paris rubans are set put in suitable vessel and place over fire till it becomes fine and granular; moist blood clot; charcoal and mutton suet, iii. P-11; *acetanilid. pulp., loc., v. A-5; sol. fusosilicate sol. (1-8 to m.), v. A-75; sol. hydrargy. bicarb. and pot. iod. eq. pta. (1-400), v. A-92; absorbent paper, iii. P-9.*

**SURGICAL DRESSINGS, MATERIALIZED.**  
*Atropin, anodyne, and antiseptic "sanitas," loc.; creolin, antiseptic and styptic watery sol. (1-1000 to 12-1000); powd. (creolin, 5 pta.; alum, 100 pta.), or combined with oil or glycerine; argyrophoric acid, antiseptic; hydro-naphthol, a n. t. p. t. i.; beta-naphthol, as substitute for iodoform; B glycerite of starch, 1000 pta.; corros. sublimate, 1 pt.—M. (bland, antiseptic, and absorbent); B camphor, 31 (4.0 grm.); turpentine, 31 (31.0 grm.)—M.; antiseptic dressing; for continuous use may be mixed with olive oil in any proportion, iii. P-12; pure iodoform test, odor marked with *bala. Perus.* or a combination of musk, almond oil, and perfumes; bituminated iodoform (iodoform and tar); iodoform gauze, preparation of; antiseptic powders of calcined infusorial earth. "Kirselsuhr" or "Vergmehl;" may be medicated with *ac. carbolic, zinc chlor., ac. salicyl., iodoform, iodoform,* used dry, with gauze bandage; B *creoline, 1 to 2 pta.; iodoform, 98 pta.—M.* Used as dusting powder, iii. P-13; oxyganate of mercury-germicide (1-1500), v. A-91; powder for making antiseptic sol.; B *corros. subl., 0.06 pt.; sod. chloride, 0.25 pt.; ac. carb., 2 pta.; zinc chloride, 5 pta.; ac. borac, 3 pta.; ac. salicyl., 0.6 pta.; thymol, 0.1 pt.; ac. curic, 0.1 pt.—M.* Dissolve in 20,000 parts of water for use, iii. P-14.*

**SYCOSSIS.**  
**NON-PARASITIC.**  
Regular shaving, foll. by constant appl. of carbolic, mercurial, or resorcin plaster, muslin; or if nocturnal treat. alone is possible, *zinc-sulphur salve, muslin,* to be worn at night, foll. in morning by epilation of pustules, washing the part, and applying sol. *resorcin (5%) a/c.* to each affected follicle; sulphur, ichthyol, resorcin, pyrogallol, and chrysarobin (in 2% to 5% ointments), or ichthyol, in 10% emuls. may be used at night; if beard is not shaved, depilate every hair showing pustule at base, wash

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	<i>ac. carbolic</i> ; Blake's tym-	
	ppanic syringe; <i>alcohol</i> and	
	<i>aq. sol. of zinc, sol. bicarb.</i> ,	
	<i>sol. chloridi</i> , less copper,	
	etc.; powders of no use—may	
	do harm; avoid escharotics	
	or caustics; drainage by en-	
	larging the opening or exci-	
	sion of the memb. tymp. and	
	the malleus and incus; if	
	latter are necrotic, scrape	
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	If ABSCESS,	
	and pus discov., and pat.	
	growing weaker after 3d day,	
	an exploratory opera. should	
	be done before end of 1st	
	week or before; continue if	
	pus is found; abandon if not	
	found.	
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	3 or 4 days; <i>bismuth salicy-</i>	
	<i>late</i> if diarrhoea; [ <i>R. Bism.</i>	
	<i>salicyl.</i> , gr. 62 to 77 (4.0 to	
	5.0 grm.); <i>glycerin</i> , 33 to 5	
	(12 to 20 grm.); <i>aquar</i> , 33 33	
	(100.0 grm.)—M. S.; Shake.	
	Tea to dessert-spoonful ev. 2	
	hrs., i. H-40; <i>calomel</i> , gr.	
	4½ to 7½ (0.30 to 0.50 grm.),	
	or gr. 1-6 (0.01 grm.), ev.	
	hour till salivation appears;	
	daily enemata of starch-	
	water or simple water, ac-	
	cording to presence or ab-	
	sence of diarrhoea; antiseptic	
	and nutrient mixture; <i>gly-</i>	
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IF PACHYDERMIA.	
Cataplasms and baths, fol. by black soap appl. on flannel bandages, covered with frumber rolls of flannel, without compression, cover with rubber tissue and leave several days; massage, cataplasma, and baths; Martin's rubber bandage; incision around ulcer, $\frac{1}{2}$ inch outside; incision all round the border to relieve tension; scarifications. IV. A-14; amputation (when circular etc. strangles the limb). IV. A-15; long incisions up the leg, dissect out veins, tie at extremities of wound; strict antisepsis, IV. A-16.	
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2. Withdraw or dilute the poison by venesection, sweating, purging, transfusion.	
3. Oxidize and consume the poison by exercises or by using oxygen or oxidizers.	
5. Antagonize toxic manifestations and meet special symptoms.	
<i>Pilocarpine</i> [gr. 1-6 to 1-3 (0.01 to 0.02 grm.)] hypod., <i>cocaine</i> [gr. 1-6 to 1 (0.01 to 0.06 grm.)] hypod., <i>sod. benzoate</i> [gr. 5 to 15 (0.53 to 1.0 grm.)] av. 1 or 2 hrs., v. A-37; I. G-40.	
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ELECTROLYSIS.

External, *potter's clay electrode, water rheostat*: intra-uterine electrode, ii. E-31; if pain, positive galvanopuncture, gold needle; if ham., inject. of *gelatine* into ut., electrode in centre; current, 50 to 100 milliamperes; but 1000 milliamperes may be used, ii. E-32; 200 to 250 milliamperes, v. D-29.

OPERATIVE.

Slow dilatation of uterine canal to stop hamor.; vaginal enucleation; "morcellement"; *écraseur* for pediculated growth; incision of capsule for sessile growths, fol. by *ergot*, tampons, and electricity, and if not expelled, enucleation with fingers, ii. E-34; vaginal hysterectomy; castration; abdominal hysterectomy, ii. E-35.

UTERUS, INVERSION.

Elastic pressure (Aveling's sigmoid retractor); incision of os and regulated constant pressure; Thomas' method (dilatation of the ring thr'gh an abd. incision); amputation with *écraseur*; removal of ovaries and tubes, and elastic ligature about the cervix, ii. E-16.

PROLAPSE.

Brandt's uterine gymnastics; faradism, current from thick, short wire-coil, for quantity; Alexander's operation; Breisky's egg pessary, ii. E-15; colpoperineorrhaphy, Hegar's method, ii. E-16.

IF ACUTE.

Munin bandage and constant irrigation with *liq. plumbi et opii*, elastic bandage, and then reduction of organ, ii. E-15.

RETROVERSION.

Pessary; general treat., rest and tonics; Byford's mod. of Miller's retractor, ii. E-6; Alexander's op., ii. E-7; vaginal suture of uterus, ii. E-11; ventral fixation after laparotomy (hysterorrhaphy), ii. E-12.

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Careful stretching of adhesions, Schultze's meth., i. E-6; Ter-Grigoriantz meth., i. E-7.

SUBINVOLUTION.

Galvanic and faradic currents, alternating, v. D-31.

NEUROSES.

*Putus, bromide* [gr. 10 to 30 (0.65 to 2.0 grm.) combined with bitter tonic], ii. E-60; *Ext. eulterior fol., apt. ammon. arom., apt. lavand. co.* 33 pts. seq. (teaspoonful ev. 4 to 6 hrs.); *B. ext. hyoscyamus*, gr. 1 to 3 (0.065 to 0.20 grm.); *put. camphore*, gr. 3 to 10 (0.2 to 0.6 grm.) in pill; galvanism.

REFLEX COUGH.

*Put. bromide*, gr 10 to 30 (0.65 to 2.0 grm.); *quinine*, gr. 5 to 15 (0.32 to 1.0 grm.) with local treatment, ii. E-61.

CLIMACTERIC FLASHINGS.

With feeling of suffocation and pericardial distress, use *ext. quercus fol.*, 30 drops, ii. E-52.

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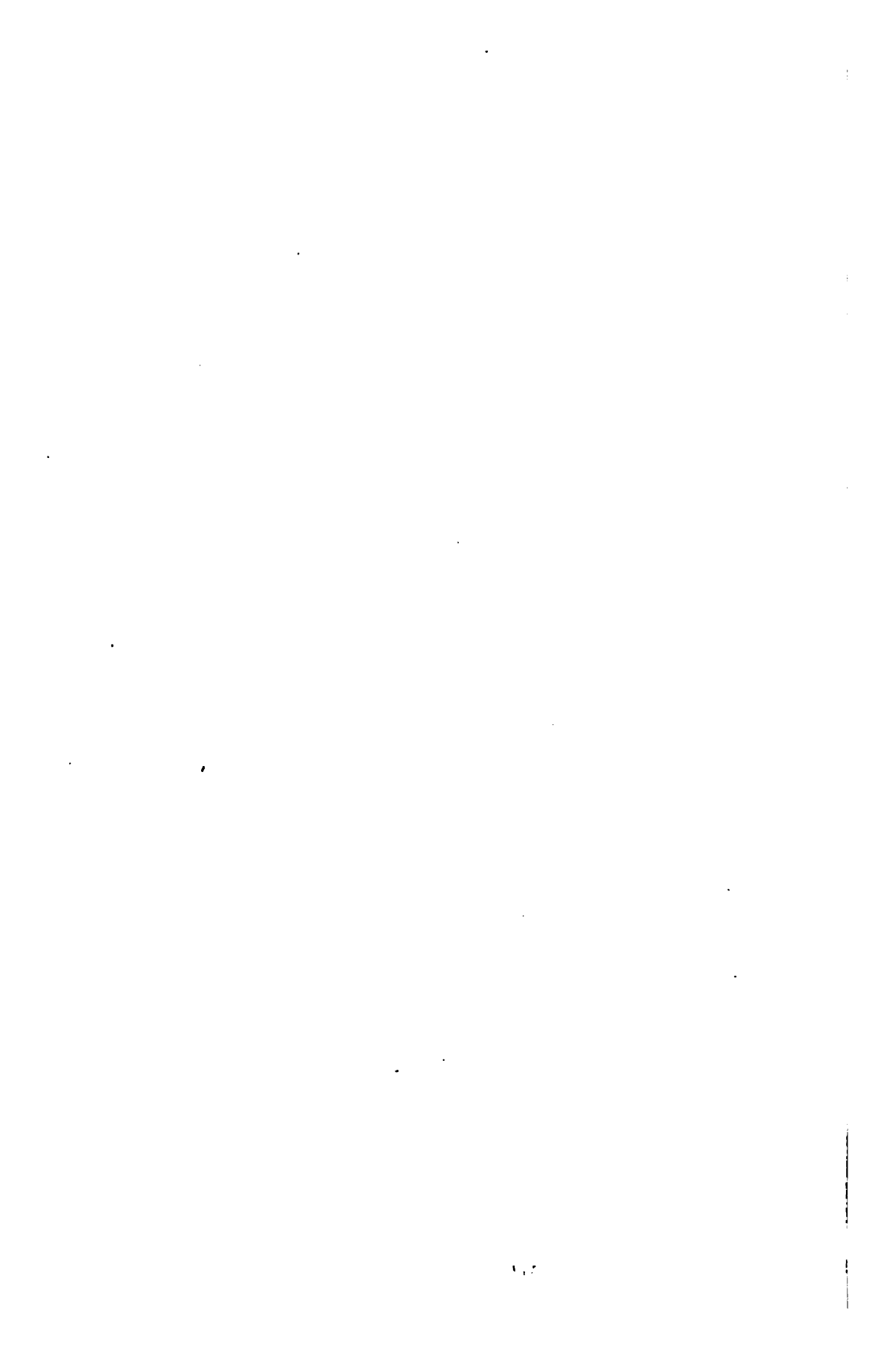
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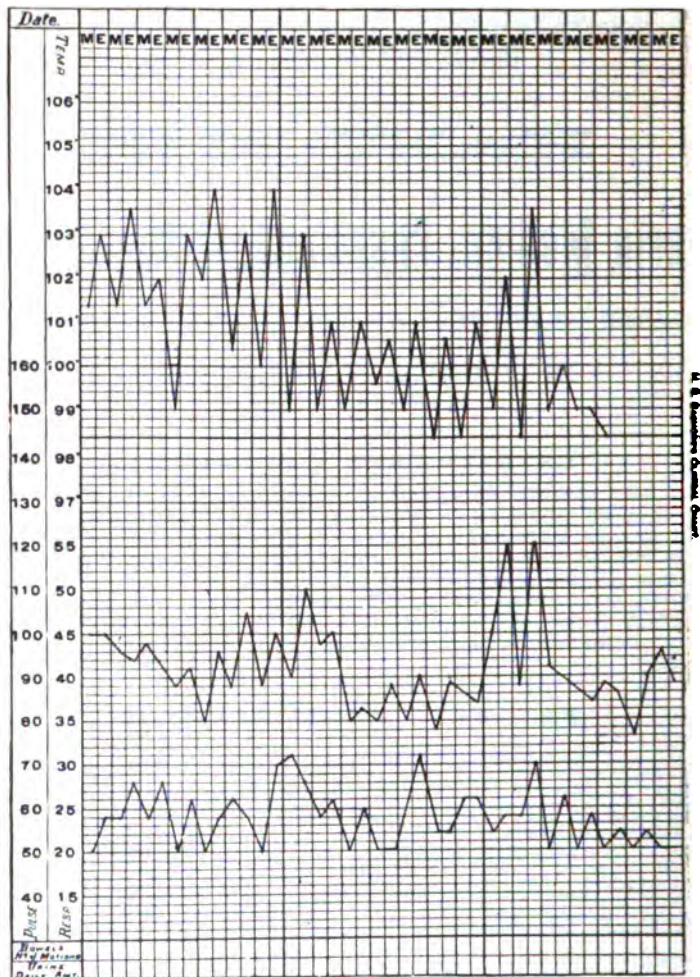
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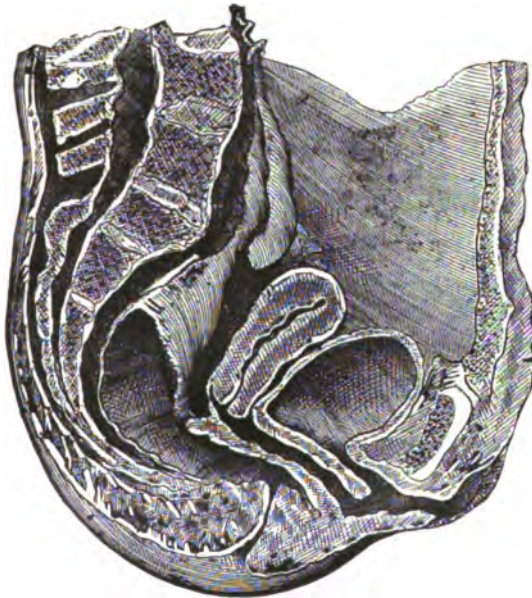
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in the position and in the axis of the womb, are downward, or forward, or backward, or to one side. To these I shall now direct your attention.

FIG. 44.



NATURAL POSITION OF THE WOMB WHEN THE BLADDER IS FULL.  
AFTER BRIESKY.

*RETROVERSION AND RETROFLEXION OF THE WOMB.*

By a retroversion of the womb, we understand a backward tilting of the fundus towards the sacrum, and an advance of the cervix towards the pubes—that is to say, it is a posterior inclination of the body of the womb without any bend in its axis. By a retroflexion of the womb is meant a backward bending of the womb upon itself, the fundus upon the cervix posteriorly.

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On this Chart there are 475 first names; Section A. is numbered from 1 to 50, each section commencing with the capital letter, and having its own numbers on both left-hand and right-hand columns, to prevent mistakes in lining out, all in quite large type. In the centre of the Chart, occupying about 6 inches in width, is a term index of common names. In the second column of Chart, like this:

ACONITE LEAVES,      4 A.

Then by reference to 4 A in first column, you there find the Botanical or U. S. P. Name. On this Chart is also found a brief definition of the terms used, under the heading "Medicinal Properties."

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Alkaloids and Concentrations are tabulated with reference numbers for the Perpetual Clinical Index, giving Medicinal Properties, Minute Dose and Large Dose. For example, ALKALOIDS AND CONCENTRATIONS:

A.	MEDICINAL PROPERTIES.	MINUTE DOSE.	LARGE DOSE.
(a) Aconitine.	Narcotic and Apyretic.	1-500 gr.	1-16 gr.

Following this, Preparations of the Pharmacopœia, each tabulated. For example:

#### TINCTURAL.

TINCTURA.	DRUG.	AMOUNT.	ALCOHOL.	DOSE.
* Aconiti.	{ Aconite. Tartaric Acid, 60 † P.	5½ oz. to 24 gr.	100	1 to 3 drops.

\* 60 Fineness of Powder as per U. S. P.

† P. Macerate 24 hours. Percolate, adding Menstruum to complete (1) pint tincture.

They are all thus abbreviated, with a ready reference head-note.

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NAME.	DOSES.	SPECIFIC GRAVITY.	SALT OR ALKALOID.	MEMORANDA.
-------	--------	-------------------	-------------------	------------

This Memoranda place is for Physicians' or Pharmacists' reference notes; and with the addition of several tabulated blank pages, in which to add any new chemical, with doses, etc. The remaining sixteen pages for Materia Medica Index, leaving blanks following each other for new names and reference numbers.

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FIG. 117.—PAROTID AND SUBMAXILLARY FISTULÆ IN THE HORSE, AFTER  
COLIN. (*Thanhoffer and Tormay.*)

K K', rubber bulbs for collecting saliva; cs, cannula in the parotid duct.

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oughly macerated and soaked in fluid, and from which they are forced into the œsophagus during rumination or into the honey-comb bag during the intervals of rumination. It is evident, therefore, that the food contained in this pouch may undergo changes due to the movements to which it is subjected, the temperature, and the action of saliva and other fluids. The changes are, therefore, physical and chemical. The walls of the rumen, by their contractions and resulting movements, may exert a considerable amount of mechanical force on the aliments contained within it, although this has been greatly exaggerated. Nothing like trituration takes place, but simply thorough mixing of the new and old food together

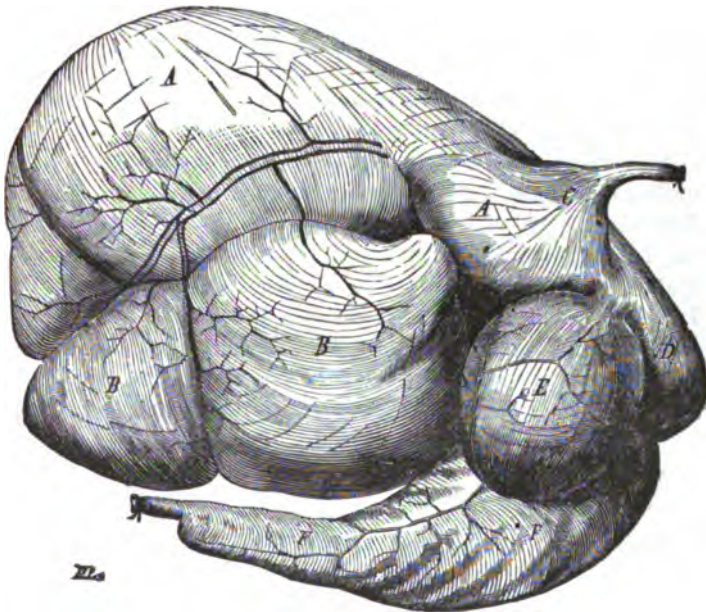


FIG. 153.—STOMACH OF THE OX. (*Colin.*)

A, rumen (left hemisphere); B, rumen (right hemisphere); C, insertion of the œsophagus; D, reticulum; E, omasum; F, abomasum.

and with fluid; consequently, it is not necessarily the portion of food which first enters the paunch which is the first to leave. The maceration which the food undergoes in the fluids of the paunch is especially marked in the case of grain and dry fodder, and is greatly assisted by the temperature of the organ.

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- attached by vessels to several small *placentæ succenturiatæ*. The clinical importance of multiple *placentæ* lies in the fact

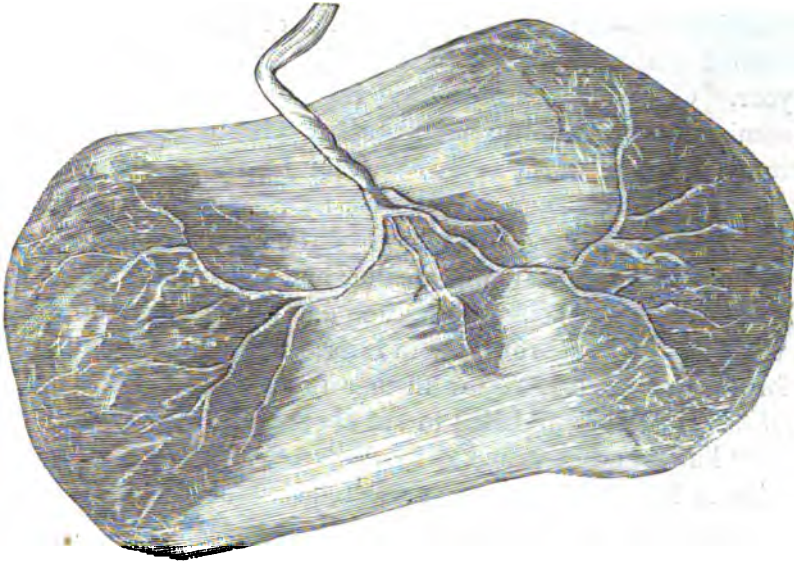


FIG. 2.—(*Annales de Gynécologie.*)

that one of these lobes may be retained in the uterus, while the other is expelled; and this accident is apt to occur if the attendant

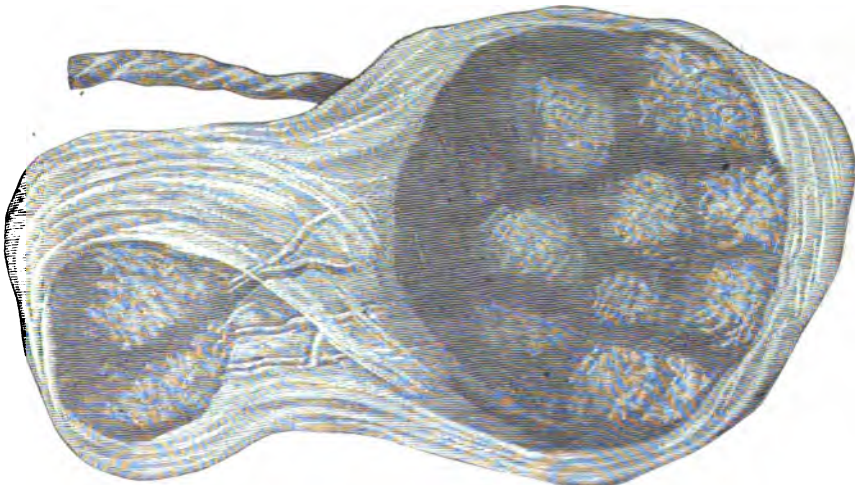


FIG. 3.—(*Annales de Gynécologie.*)

is in too great a hurry to remove the placenta. The practitioner should always carefully examine the placenta,—not only to see

under certain conditions; and it does not yet seem to have been satisfactorily demonstrated that the cyanosis is not due to some deleterious alteration of the blood.

*Antipyrine.*—The antipyretic action of this drug is so well understood that we find but little published concerning it during the year. Guitéras<sup>38</sup> considers it worse than useless to persist in the administration of antipyrine for many days in the course of the continued fevers of warm countries; and he has frequently found that its discontinuance was followed by a regular reduction of the temperature, with improvement of the other symptoms. He also noticed that the heart was weaker and the arterial tension less while antipyrine was being administered. Minot<sup>38</sup> gave antipyrine and thalline in 24 cases of typhoid fever, finding that 20–30 grs. of the former was needed. (For further notes of Minot's paper, see "*Thalline*.") Robison<sup>39</sup> failed to cut short typhoid fever by its use. Gradle<sup>39</sup> has found it valuable in doses of 4 grs. in the fever of dentition in infants, where there was a possible danger of convulsions. Scott<sup>21</sup> obtained good results from it in 2 cases of puerperal fever, as well as in 4 of malarial fever. An editorial writer<sup>12</sup> mentions the rapid reduction of a temperature 107.5° F. in a case of malarial fever, though he does not consider that the drug is any thing more than a simple antipyretic in this disease.

As regards phthisis, we find Patrick<sup>39</sup> declaring it very valuable in a few cases in which he has tried it, giving a dose every afternoon. Laache<sup>35</sup> made a special study of its action in phthisis, and found that it, as a rule, brought down the hectic fever very satisfactorily. Olikoff<sup>35</sup> confirms the reports in several journals concerning the hæmostatic action of antipyrine. In 6 cases of hæmoptysis he has employed a solution of 90 grs. in 6 ounces of water, used by inhalation, and has ordered 5–6 inspirations through the inhaler every  $\frac{1}{2}$ –1 hour, diminishing the hæmoptysis at once, and soon arresting it entirely. Snyers<sup>22</sup> has made trial of the comparative value of antipyrine, antifebrine, thalline and kairine, and much prefers the former. The defervescence, he says, is less rapid, and a subsequent rise slower and more regular; hence there is less abundant perspiration and less chilliness. Müller<sup>22</sup> agrees with this statement, but claims that the slower rise after antipyrine does not always take place, and is sometimes even more abrupt than after antifebrine.

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9. It has nearly *one-third more matter on each page* than most works in this field—thus condensing a large amount of matter into a handy volume.
10. It is particularly designed for the use of the *general practitioner of medicine*.

This work considers nervous diseases from the standpoint of cerebral and spinal localization and the later methods employed in the diagnosis and treatment of these affections. The chapters on functional nervous diseases respecting the bearings of eye defect and eye strain upon the cause and cure of these diseases, on the clinical examination of patients, and electricity in medicine, will form, we believe, the most interesting part of the book to the general practitioner.—*Medical Age*.

The illustrations are numerous and instructive. To an unusual degree he has employed diagrammatic illustrations, colored. The work certainly contains a large amount of very valuable material arranged in a readable shape. It is well printed upon good paper.—*American Lancet*.

We are glad to note that Dr. Ranney has published in book form his admirable lectures on nervous diseases. His book contains over seven hundred large pages, and is profusely illustrated with original diagrams and sketches in colors, and with many carefully selected wood-cuts and reproduced photographs of typical cases. A large amount of valuable information not a little of which has but recently appeared in medical literature is presented in compact form, and thus made easily accessible. In our opinion, Dr. Ranney's book ought to meet with a cordial reception at the hands of the medical profession, for, even though the author's views may be sometimes open to question, it cannot be disputed that his work bears evidence of scientific method and honest opinion.—*American Journal of Insanity*.

The next page is a specimen from the work itself.

(F. A. DAVIS, Medical Publisher, Philadelphia, Pa., U.S.A.)

(37)



an *unbearably painful current* should be ascertained and noted. This may be compared with that necessary to produce contractions upon the healthy side.

The next step in the examination consists in *changing the rheophores to the binding-posts of a galvanic battery*. We can now ascertain the number of cells or milliampères (which is preferable) required to produce the different varieties of contractions (enumerated in the table designed for record) of muscles in homologous regions of the right and left sides. Each nerve which is impaired should be tested first; and the muscles



FIG. 61.—THE AUTHOR'S DIAGNOSTIC KEY-BOARD AS APPLIED IN ACTUAL USE.—The spring electrodes are represented in the cut (for the purpose of illustration) as applied to the facial, ulnar, and musculo-spiral nerves of each side. If he so chooses, the operator can have his case-book on a stand at his right, for recording his observations as they are made.

supplied by it should be tested afterward. The strength of the current employed should be ascertained by throwing a galvanometer into the circuit (when extreme accuracy is desired); by so doing, a comparison of the nerve- and muscle-reactions of the two sides can be based upon conditions which are exactly alike.

When we have completed the steps indicated by the chart prepared for the assistance of the practitioner (page 191) we are in possession of certain facts which may be of great practical value as regards both diagnosis and prognosis:—



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"This is one of the most excellent works we have seen, treating of the important and troublesome diseases of the upper air-passages, and makes a most excellent guide for the general practitioner in the treatment of diseases of the nose and throat."—*Southern Practitioner*.

Of the three acids mentioned, chromic acid is by far the most satisfactory for posterior applications. Nitric acid is not sufficiently safe, while glacial acetic acid requires too many applications.

When an application is to be made, the instrument is adjusted so that the curved tip will take the proper direction on emerging, and the end of the rod is protruded. The tip is heated slightly to the fire of a match, and dipped among the crystals of the acid, then allowed to re-enter the tube. Enough of chromic acid will have adhered to the rod for the application. The tube being passed through the nasal cavity as far as the hypertrophy, the rhinoscope, held with the left hand, is placed in position, and the parts are illuminated. The location of the tube being ascertained, its point is placed against the side of the growth, and the spring is pressed upon. This forces the acid-covered point to emerge, the bend causing it to apply itself against the growth. By now drawing the instrument out a short distance, the application can be made more effective, the point thus parting with all its acid on the hypertrophied membrane as it rubs against it. The pressure on the spring being then released, the point disappears in the tube, and the instrument can be withdrawn. A solution of bicarbonate of soda, used posteriorly with the atomizer, is always indicated after this operation, to neutralize any excess of the acid that might have remained on the membrane, and to limit absorption. Four or five applications of this kind generally cause marked shrinkage of a moderate-sized growth.

Galvano-cautery can also be used in the same manner by introducing the cautery knife *d* (Fig. 33) instead of the acid application. The loop is introduced cold and applied against the side of the growth. Its position being ascertained with the rhinoscope, the circuit is closed, the handle being at







